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ABSTRACT

This handbook contains information on: (1) the orbit of comet Halley; (2) the expected physical behavior of comet Halley in 1985-1986, considering brightness estimates, coma diameters, and tail lengths; (3) observing conditions for comet Halley in 1985-1986; and (4) observing conditions for the dust tail of comet Halley in 1985-1986. Additional information in appendices includes: historical, physical, and orbital data; ephemeris data (with perturbations) at 5-day intervals from July 24, 1982 to August 7, 1984; and ephemeris data (with perturbations) at 1-day intervals from August 8, 1984 to May 4, 1987. (JN)

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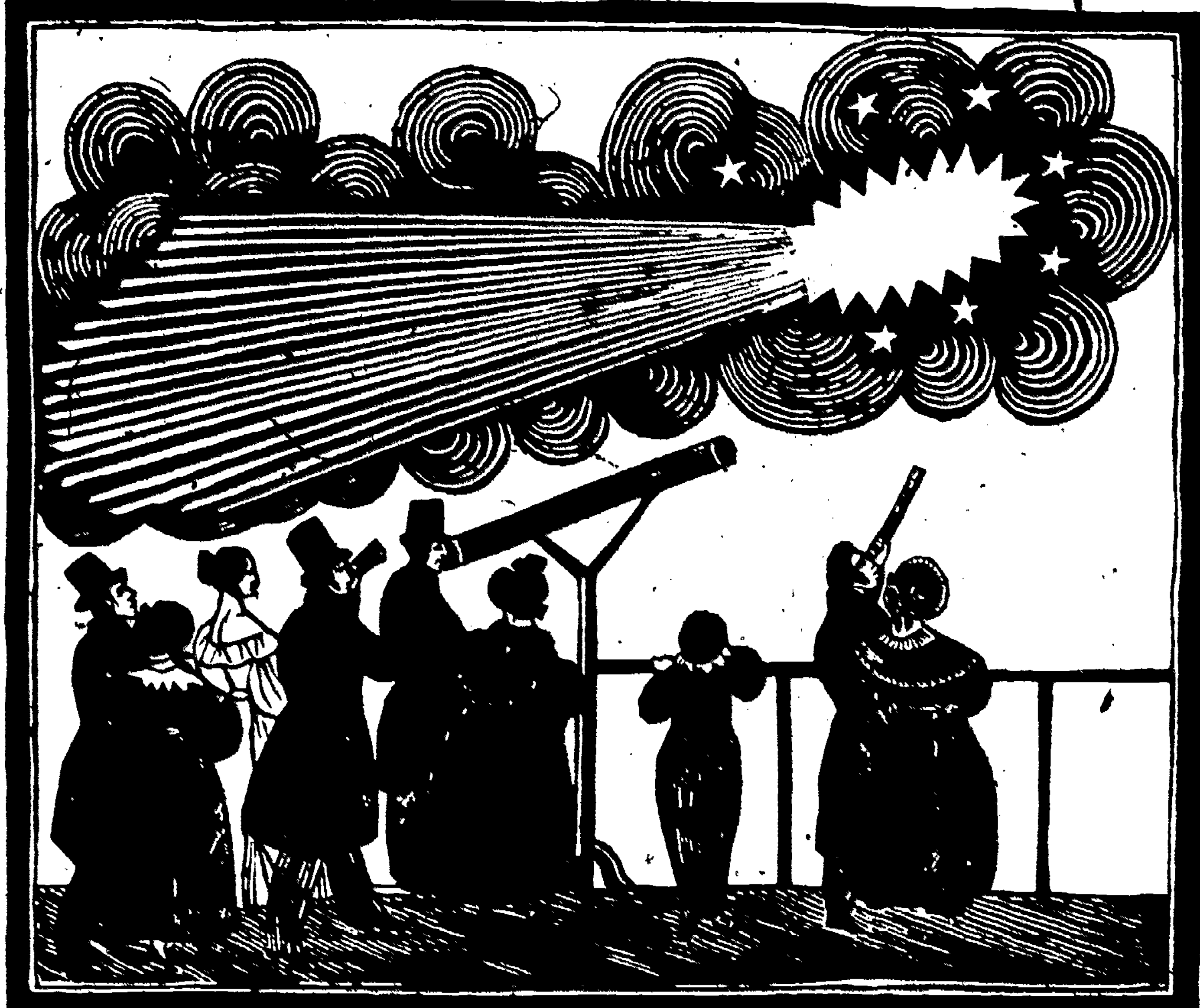
THE COMET HALLEY HANDBOOK



AN OBSERVER'S GUIDE

SECOND EDITION

SE 045 754

Cover: from a French broadside announcing the arrival of Comet Halley in 1835 — courtesy of the Bibliotheque Nationale, Paris, France.

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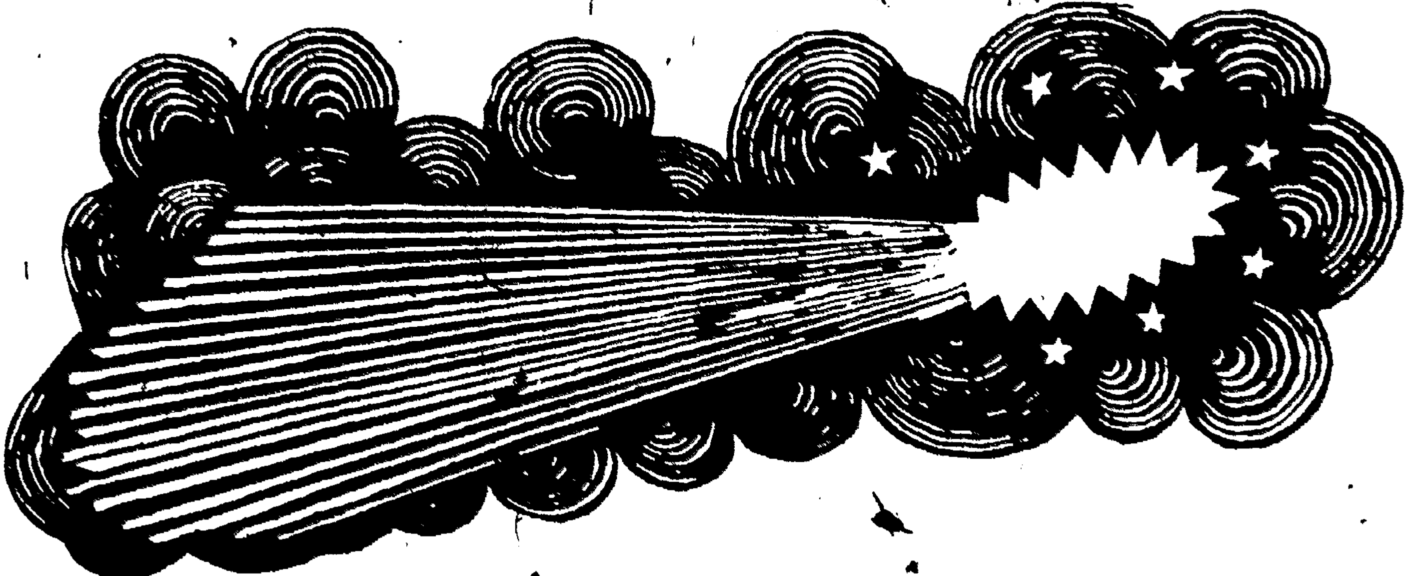

AN OBSERVER'S GUIDE

SECOND EDITION

CREATED FOR THE INTERNATIONAL HALLEY WATCH

BY

DONALD K. YEOMANS

WITH A CONTRIBUTION FROM ZDENEK SEKANINA

MAY 15, 1983

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Frontispiece. This image of Comet Halley, taken with the 200 inch Hale Telescope at Mount Palomar, shows the comet (circled) as it was recovered by Caltech astronomers David Jewitt and G. Edward Danielson on October 16, 1982. The comet was found within a few arc seconds of the position predicted in the first edition of The Comet Halley Handbook.

FOREWORD

After five years of unsuccessful attempts, California's giant Mount Palomar telescope recorded an image of Comet Halley on October 16, 1982. When first recovered, the comet was located beyond the orbit of Saturn and was as faint as the light from a single candle seen 27,000 miles away. By the end of 1982, the comet had been observed at Arizona's Kitt Peak Observatory telescope, at the Canada-France-Hawaii telescope located in Hawaii, and at the European Southern Observatory telescope in La Silla, Chile. Compared with the first observations made during its previous return in 1909, the recent recovery observations were made when the comet was three times further away from the Sun and about 2,000 times fainter. Comet Halley has been recorded at each of its last 28 returns to the Sun — in fact, Chinese records noted the comet's visits as far back as the spring of 240 B.C. Every 76 years or so, the comet returns and reintroduces itself to a distant group of curious observers.

Because of their infrequent apparitions and peculiar appearances, comets have been feared and misunderstood throughout most of recorded history. They were considered to be malefic signs — warning shots thrown at a sinful Earth from the right hand of an angry God. While no longer feared, comets remain misunderstood, perhaps the least understood members of our solar system. Comets are thought to be composed of a primitive collection of ices and dust. An intensive study of their composition could offer valuable insights not only into the nature of comets themselves but also into the nature of the primordial mixture from which our solar system formed some 4.5 billion years ago.

Comet Halley is coming, and thousands of professional and amateur astronomers are making plans to study this most famous of all comets before and after it swings around the Sun in February 1986. The International Halley Watch is coordinating and archiving ground-based observations made in various wavelengths using many different techniques. While the comet's coming apparition will disappoint much of its waiting public, the international scientific observations certainly will be rewarding. Unlike observers during the previous 22 centuries, scientists will not be content to view the comet from afar this time. Five spacecraft, representing several different countries, will fly by the comet in March of 1986, and their close-up observations of the inner cometary regions will complement the ground-based observations of the comet's outer regions. It is hoped that this handbook will be useful in planning these important observation programs.

Scientists from more than 40 countries are cooperating with the coordination of ground-based and space observations of Comet Halley. It is ironic that the same comet that has caused fear and misunderstanding throughout history should now serve as the focal point for an unprecedented level of international scientific cooperation.

PREFACE TO THE SECOND EDITION

This second edition of the Comet Halley Handbook contains an updated orbit that includes recovery observations of the comet through January 14, 1983. Improved magnitude estimates for Comet Halley have been added, as well as a section on the comet's dust tail by Dr. Zdenek Sekanina.

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The Comet Halley Handbook: An Observer's Guide

I. The Orbit of Comet Halley

Considerable portions of the information in this handbook are based upon a previous work on Comet Halley's orbit, in which the comet's path was determined from observational data in the apparitions of 1607, 1682, 1759, 1835–1836, and 1909–1911.[1] The observational data in 1607 began with a rather crude naked-eye observation on September 26 by the German astronomer Johannes Kepler. The required orbital determination computations were run over various observational data intervals with perturbations from all nine planets taken into account at each time step.

Forces other than gravity acting on a cometary nucleus introduce an additional acceleration in its motion. These so-called nongravitational accelerations are believed to be due to the outgassing rocket effect of the comet's icy nucleus.[2] These effects have been successfully modeled by Marsden, Sekanina, and Yeomans.[3] Yeomans included them in his computations for Comet Halley.[1] Using the ancient Chinese observations as constraints upon the motion of the comet, Yeomans and Kiang computed its motion back in time to 1404 B.C.[4] The Chinese records in 240 B.C. were found to be the first reliable observations of Comet Halley. To date, there are no convincing observations of the comet recorded prior to that time.

To provide the position predictions necessary for the recent recovery of Comet Halley, an orbit based upon 885 observations of the comet over the 1759–1911 interval was used. A schedule of predicted cometary positions, termed an ephemeris, was published in the first edition of this handbook. The recovery observations of October 16, 1982, found the comet only 8 arc seconds west of the predicted position.[5] This edition of the handbook gives an ephemeris (see Tables B-1 and B-2 in Appendix B) that is based upon the observations of Comet Halley made from 1835 until January 14, 1983.

The recently-updated orbital elements, which define the comet's path, are given as follows:

Epoch	1986 Feb. 19.0 (E.T.)
T	1986 Feb. 9.45175 (E.T.)
q	0.5871047
e	0.9672760
ω	111.84809
Ω	58.14536
i	162.23928

The nongravitational parameters, as defined in Reference [3], are $A_1 = 0.0565$ and $A_2 = 0.0154$ in units of 10^{-8} AU/day^2. The above orbital elements are strictly correct only for the given instant of time (epoch). However, for many low-precision computations, they can be used for several months on either side of perihelion passage (T). The comet reaches its closest approach to the Sun at perihelion and its distance from the Sun at that time (distance SP in Figure 1) is termed the comet's perihelion distance (q) and is given in astronomical units (AU): 1 AU is the mean distance of the Earth from the Sun, approximately 149.6 million km. The eccentricity (e) and the three angular elements—the argument of perihelion (ω), the longitude of the ascending node (Ω), and the orbital incli-

nation (i) complete the description of the comet's orbit. The angular elements are referred to the mean ecliptic and equinox of 1950.0 and are illustrated in Figure 1.

Figure 2 illustrates an ecliptic plane projection of Comet Halley's orbit within the solar system. Figure 3 depicts the relative positions of the comet and Earth in the 1985–1986 time period. The pre- and post-perihelion close approaches of the comet and Earth occur on November 27, 1985, and April 11, 1986, at minimum distances of 0.62 and 0.42 AU respectively. The position of the vernal equinox on Figures 1, 2, and 3 is denoted by the symbol ♈. Figure 4 shows the comet's path through the constellations for the period November 1985 until May 1986.

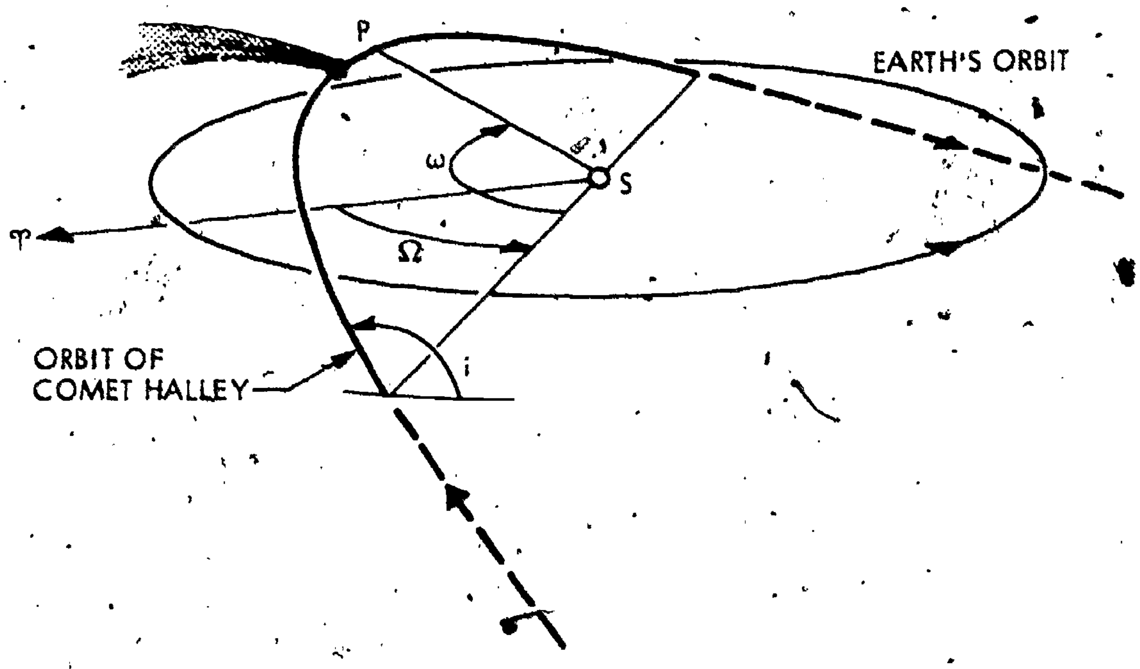


Fig. 1. Angular Elements of the Orbit of Comet Halley. For Comet Halley, the orbital inclination i is 162°, the longitude of the ascending node Ω is 58°, and the argument of perihelion ω is 112°.

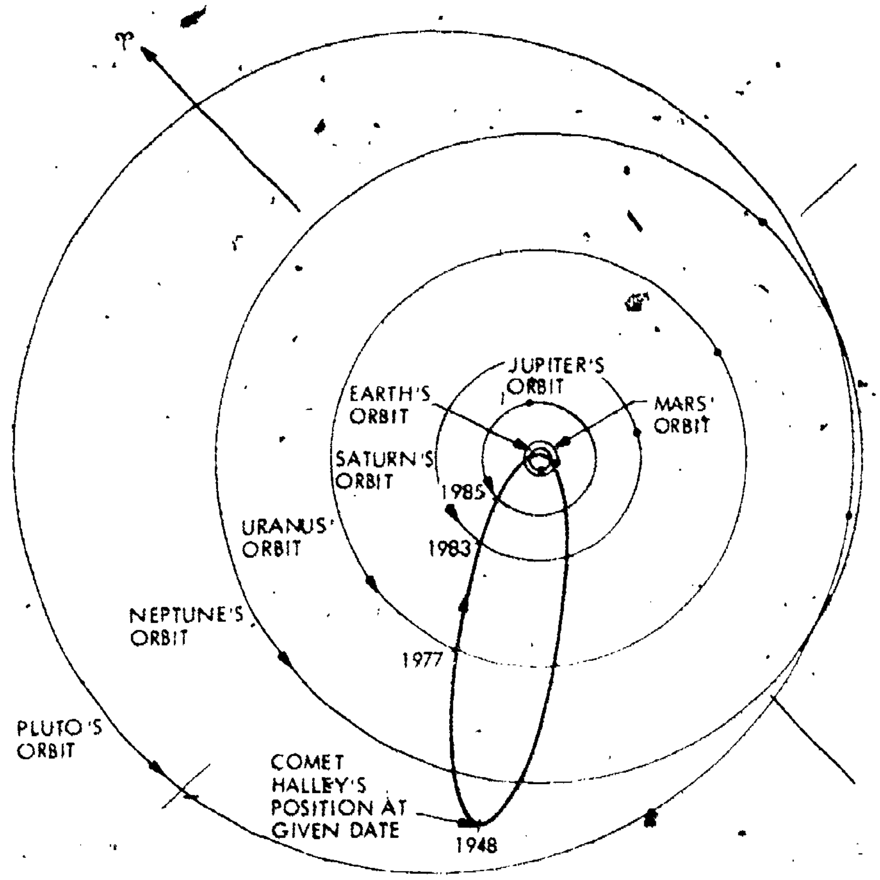
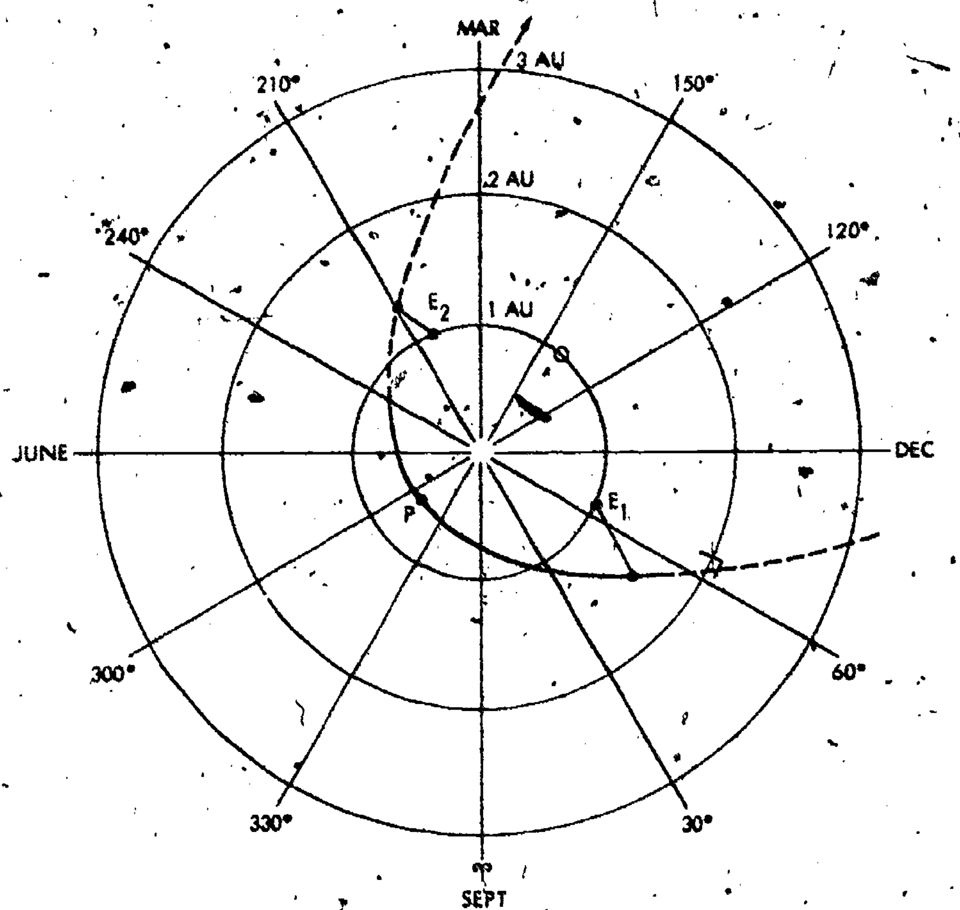


Fig. 2. Ecliptic Plane Projection of Comet Halley's Orbit (1910–1986) Within the Solar System. The planetary positions are indicated for the time of the comet's perihelion passage.



P = PERIHELION OF COMET HALLEY
E_1 = POSITION OF EARTH AT PRE-PERIHELION CLOSE APPROACH OF COMET (NOV. 27, 1985)
E_2 = POSITION OF EARTH AT POST-PERIHELION CLOSE APPROACH OF COMET (APR. 11, 1986)
O = POSITION OF EARTH AT PERIHELION OF COMET HALLEY (FEB. 9, 1986)

Fig. 3. Relative Positions of Comet Halley and Earth, 1985–1986.

II. The Expected Physical Behavior of Comet Halley in 1985–1986

Like that of other active comets, Comet Halley's physical behavior is likely to change markedly from day to day. The comet's detailed physical behavior cannot be predicted, but its general features can be estimated from information gathered in its past apparitions. In an effort to predict the comet's apparent brightness, coma diameters, and tail lengths in 1985–1986, an analysis of existing data is presented in the following subsections.

A. Brightness Estimates

An object's apparent brightness is measured in astronomical magnitudes. A star of magnitude 6 is just visible to the naked eye, and a star of magnitude 5 is 2.5 times brighter. A star of magnitude 7 is 2.5 times fainter than a magnitude 6 star, etc. The total apparent magnitude (M_1) of a comet depends upon the comet's distance from the Sun (r), its distance from the Earth (Δ), and its absolute total magnitude (M_0), i.e., its magnitude at $r = \Delta \approx 1$ AU. If the heliocentric and geocentric distances of the comet are given in AU, then

$$M_1 = M_0 + 5 \log \Delta + 2.5\, n \log r \qquad (1)$$

where n indicates the inverse power of heliocentric distance with which the brightness varies.

Visual brightness estimates of a comet are made by comparing the comet to out-of-focus stars of known brightness. These estimates depend upon the subjective judgment of the observer, the brightness of the night sky, and the type and aperture size of the telescope employed. In a recent study of Comet Halley in 1909–1910, Morris and Green reduced brightness estimates made with refracting telescopes, opera glasses, and the naked eye to a standard aperture of 6.78 cm.[6] From the pre-perihelion observations out to 3.4 AU, Morris and Green found $M_0 = 5.47$ and $n = 4.44$. Post-perihelion out to 5 AU, the corresponding values were $M_0 = 4.94$, $n = 3.07$. Figure 5 reproduces the data and resultant fit to these data points. Accordingly, the pre- and post-perihelion magnitude predictions used in Tables 2, B-1, and B-2, as well as in Figures 9-13, were computed from the following equations:

$$M_1 = 5.47 + 5 \log \Delta + 11.10 \log r \text{ (pre-perihelion)} \qquad (2)$$

$$M_1 = 4.94 + 5 \log \Delta + 7.68 \log r \text{ (post-perihelion)} \qquad (3)$$

For the same heliocentric distance, the comet is intrinsically brighter post-perihelion.

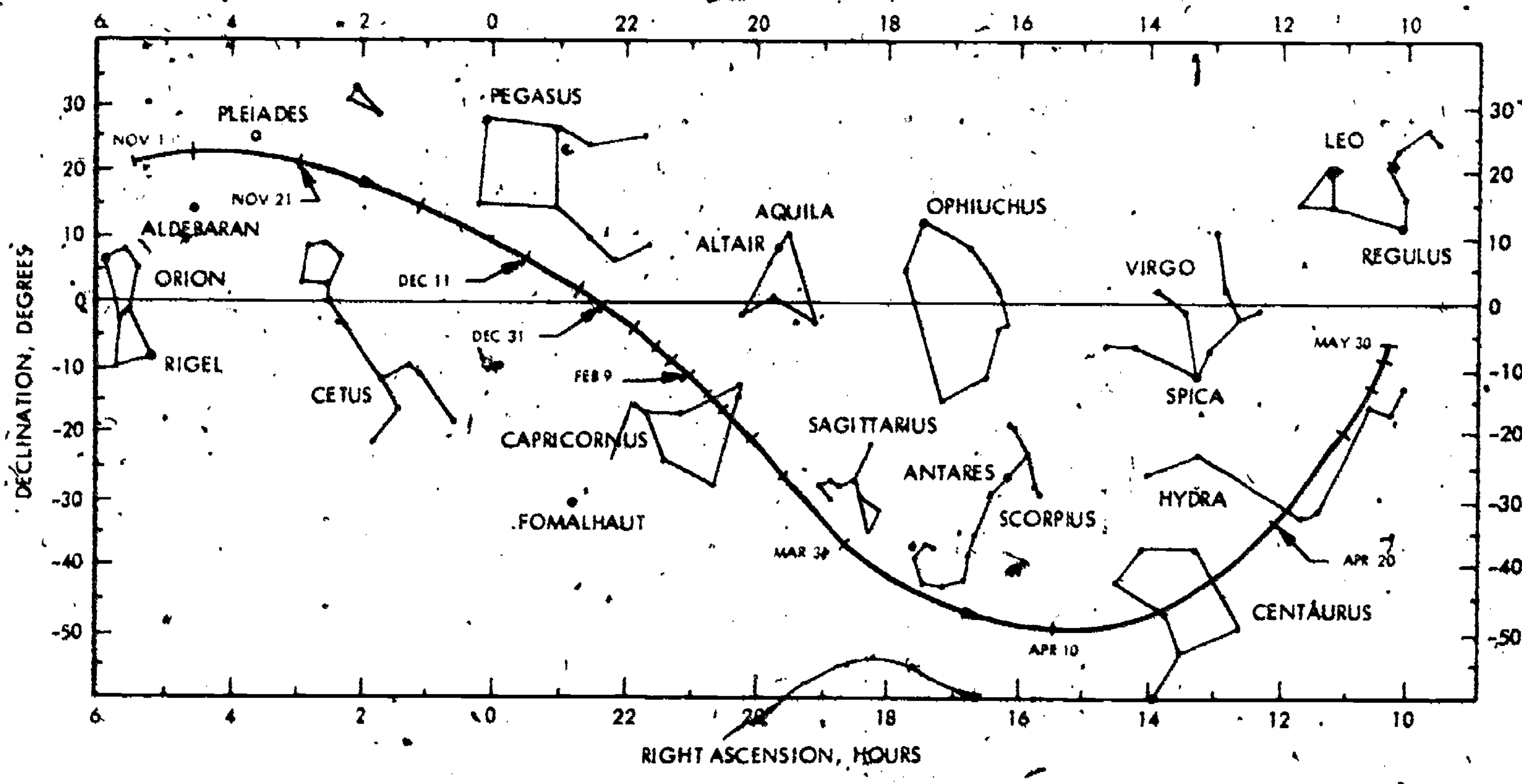


Fig. 4. Path of Comet Halley on the Celestial Sphere During November 1985—May 1986.

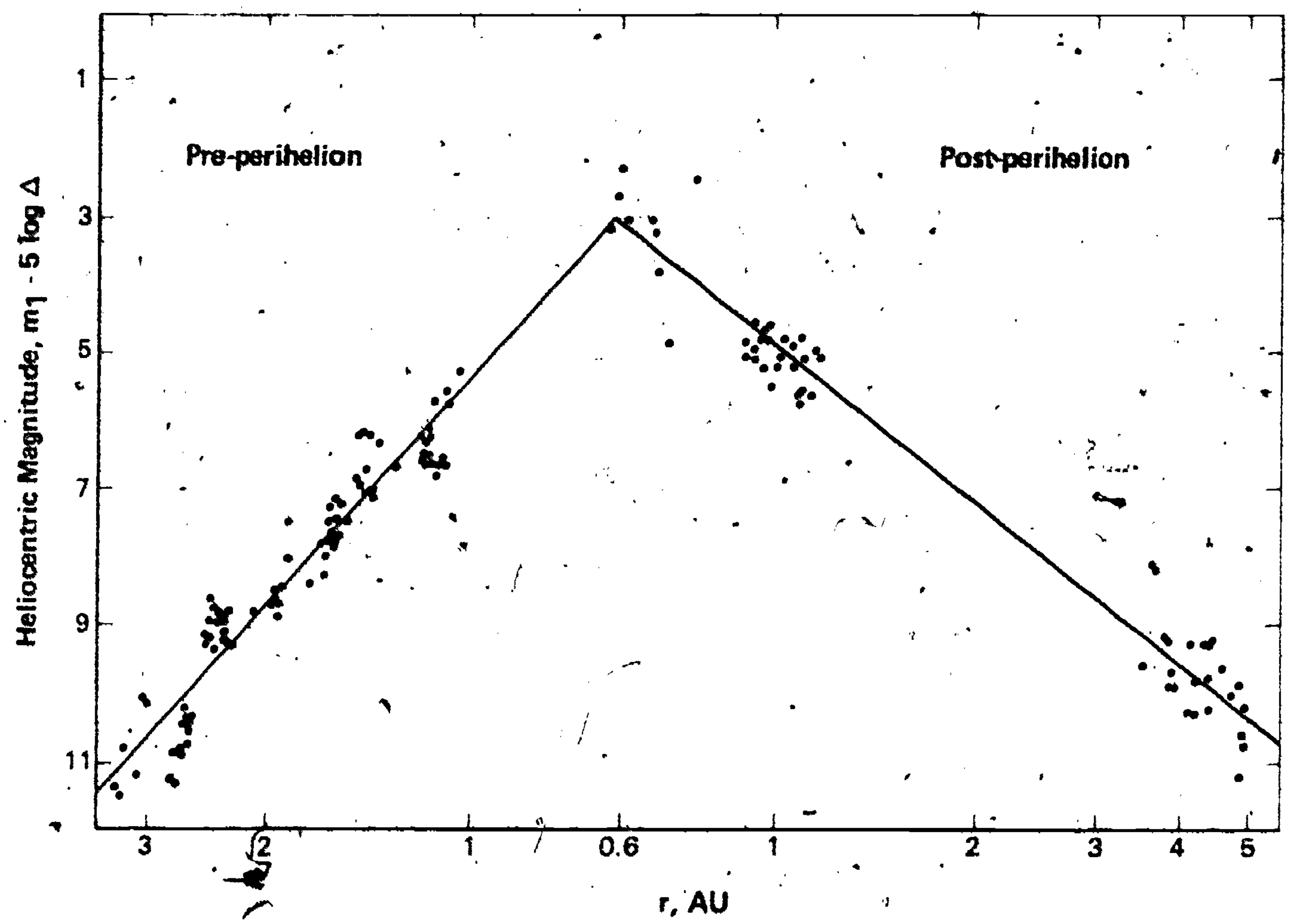


Fig. 5. Comet Halley Total Magnitude Estimates, 1909—1910 Visual Estimates Only (after Morris and Green[6]).

To be a naked-eye object, the diffuse image of Comet Halley would have to be somewhat brighter than magnitude 6. Because of its unfavorable positions with respect to the Earth and Sun, Comet Halley will disappoint much of the waiting public in the coming apparition. It may not be an obvious naked-eye object and might in fact be invisible if the observer is located in a populous area with significant artificial lighting. Successful observers will have to equip themselves with binoculars, know where and when to observe, and seek an observing location free from light pollution.

At great heliocentric distances, the cometary ices are not vaporized by the Sun and the brightness of the comet depends only upon the reflected sunlight. We will define the nuclear apparent magnitude of the comet (M_2) as its brightness when it is inactive at large heliocentric distances. The 1982 recovery magnitudes were used to determine the following relationship:

$$M_2 = 14.1 + 5 \log \Delta + 5 \log r \qquad (4)$$

Here we assume that the phase term can be neglected. The predictions for M_2 given in Tables B-1 and B-2 are meaningful only when the comet is inactive.

B. Coma Diameters

Figure 6 presents the linear coma diameters determined from visual observations made in 1909–1911. The observed angular coma diameter, in each case, was multiplied by the geocentric distance of the comet at the time of observation to obtain the linear coma diameter. Note that the coma diameter reached a maximum value of approximately 200,000 km just after perihelion. Because the actual coma diameters will depend on the optical instrument used to observe the comet, the data given in Figure 6 are crude. Nevertheless, the curve does indicate the general evolution of the coma diameter with heliocentric distance.

C. Tail Lengths

In general, an active comet such as Halley will exhibit both a dust tail and an ion tail. To a visual observer, the dust tail appears yellowish, the ion tail bluish-white. The ion tail is usually longer than the dust tail and is positioned in a direction nearly opposite to the Sun.

To obtain some idea of Comet Halley's tail evolution with heliocentric distance, r, we collected apparent tail-length data for the last three apparitions. Only naked-eye, angular, tail-length estimates were used in our analysis, and we made the assumption that the tail was always directly antisolar, an adequate assumption considering the subjective nature of the tail-length estimates. Using the comet's phase angle, β, and the geocentric distance of the comet, Δ, the actual, linear tail length, s, may be computed from the apparent (foreshortened) angular tail length, t, by

$$s = \frac{\Delta \sin t}{\sin (\beta - t)} \qquad (5)$$

The linear tail lengths, s, plotted as a function of heliocentric distance, are presented in Figure 7. While the actual tail lengths observed will depend upon the observing conditions and the optical instrument used, the shape of the curve in Figure 7 is suggestive. Comparing the 1759, 1835, and 1910 data, the comet's visual tail length appears to be longest after perihelion.

III. Observing Conditions for Comet Halley in 1985–1986

As is evident from Figures 3 and 4, the changing positions of the comet and Earth in 1985–1986 will cause different observing conditions for the comet before and after perihelion. In general, the pre-perihelion positions of Comet Halley will allow better observing conditions for northern hemisphere observers, while southern hemisphere observers will be favored post-perihelion.

Besides the seasonal variations, the observing conditions depend on the phase of the Moon. Usually the most favorable times of the month are centered on the dates of new moon, listed in Table 1.

Table 1. Times (U.T.) of New Moons, 1985–1986.

Date (1985)	Date (1986)
Jan. 21.1	Jan. 10.5
Feb. 19.8	Feb. 9.0
Mar. 21.5	Mar. 10.6
Apr. 20.2	Apr. 9.3
May 19.9	May 8.9
June 18.5	June 7.6
July 18.0	July 7.2
Aug. 16.4	Aug. 5.8
Sep. 14.8	Sep. 4.3
Oct. 14.2	Oct. 3.8
Nov. 12.6	Nov. 2.3
Dec. 12.0	Dec. 1.7
	Dec. 31.1

For a given day, the comet's observability will depend upon the observer's latitude. We have assumed that the comet will be visible to an observer if the comet is above, and the sun is simultaneously more than 18° below, the local horizon. This condition assures that evening astronomical twilight has ended and morning astronomical twilight has not yet begun (i.e., the comet is seen in a dark sky). The time interval for which this condition holds is referred to as the number of available dark hours. Figure 8 plots the available dark hours vs. calendar date for an observer at 35°N and 35°S latitude. Also plotted in Figure 8 is the total apparent magnitude, M_1, vs. calendar date. Table 2 lists the dark hours vs. calendar date for observers located at 45°N, 30°N, 30°S, and 45°S. Table 2 also gives the predicted apparent total (M_1) and nuclear (M_2) magnitudes of the comet as a function of calendar date.

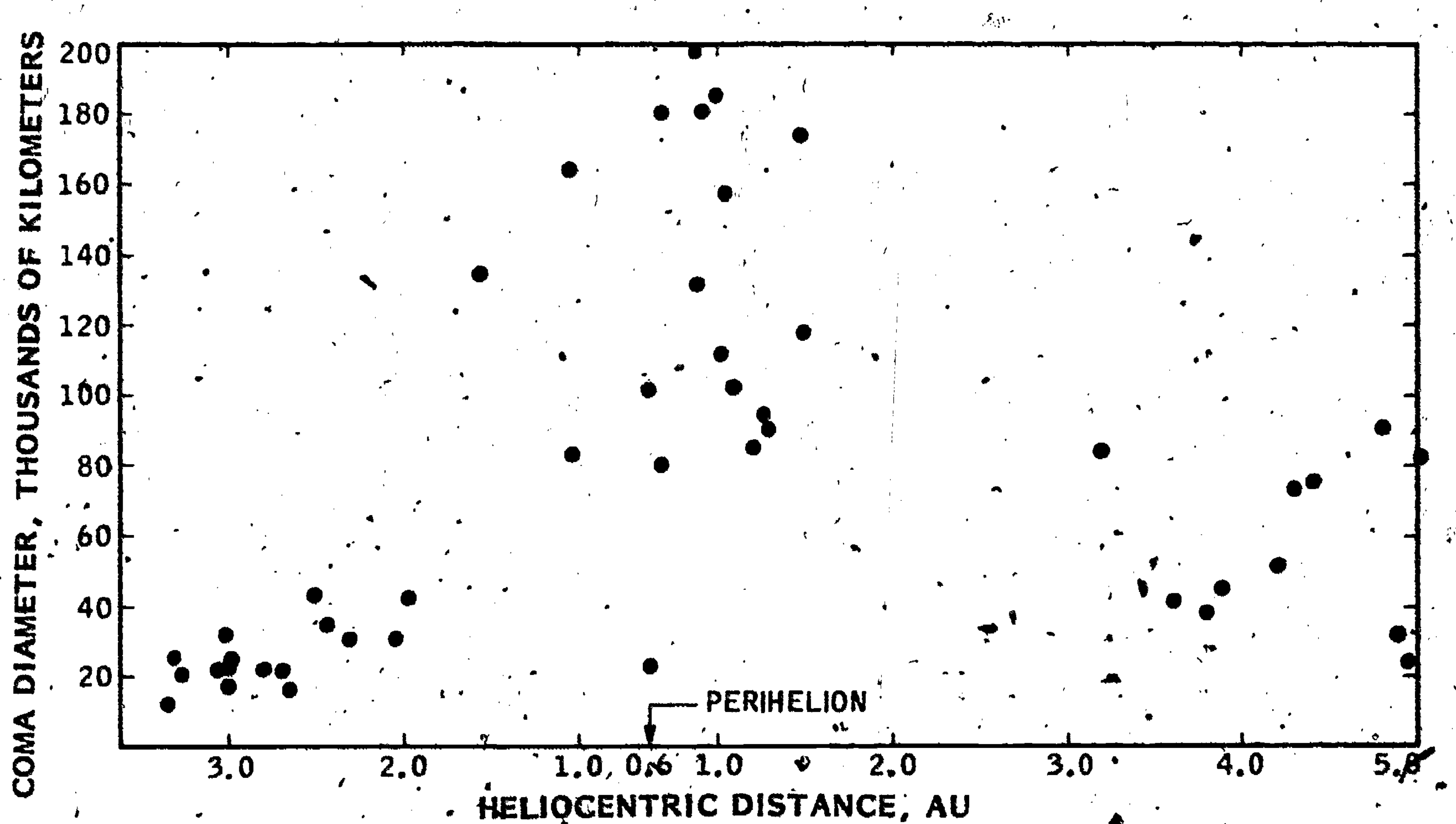


Fig. 6. Comet Halley 1909–1911 Visual Linear Coma Diameters.

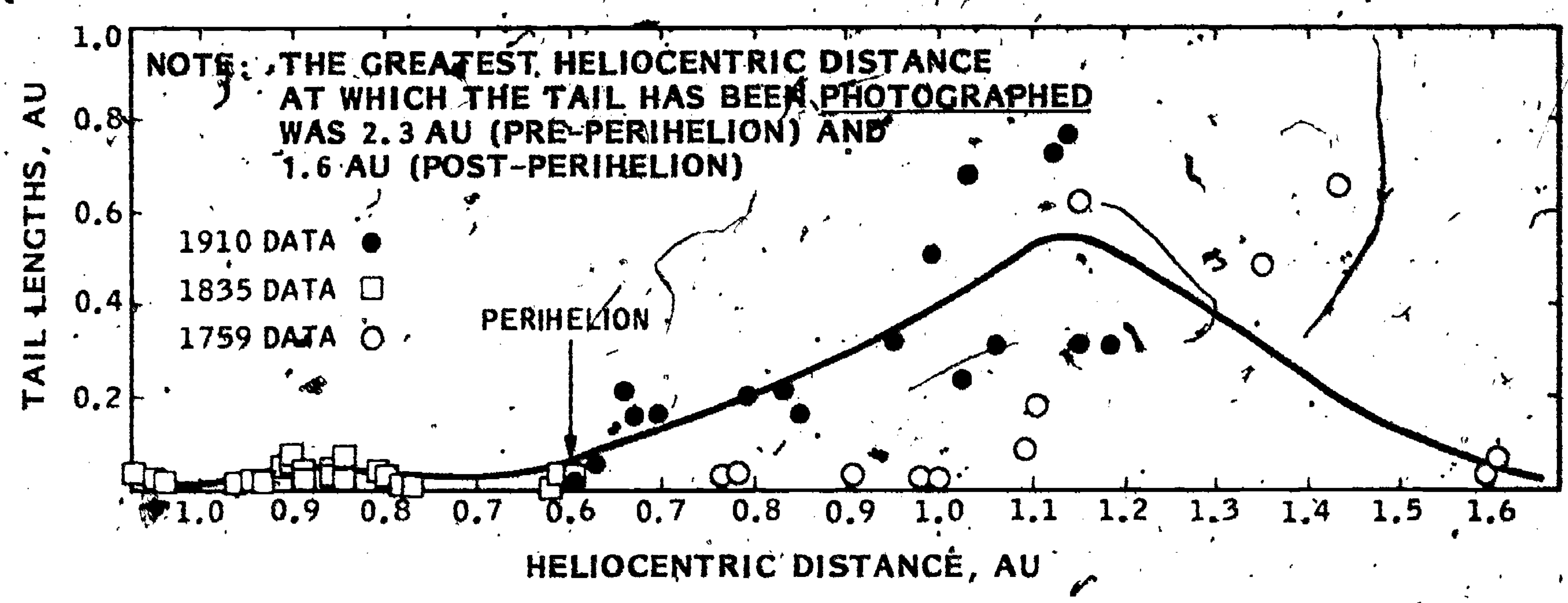


Fig. 7. Comet Halley Linear Tail Lengths Computed from Naked-Eye Estimates.

Table 2. Ground-Based Observing Data, Comet Halley 1985–1986.

Date (1985)		Dark Hours: North Lat. 45°	Dark Hours: North Lat. 30°	Dark Hours: South Lat. 30°	Dark Hours: South Lat. 45°	Apparent Magnitudes M_1	Date (1986)		Dark Hours: North Lat. 45°	Dark Hours: North Lat. 30°	Dark Hours: South Lat. 30°	Dark Hours: South Lat. 45°	Apparent Magnitudes M_1
Jan.	1	11.6	10.9	6.8	3.5	16.7	Jan.	6	2.6	2.3	0.5	0	5.6
	11	10.7	10.0	6.9	3.9	16.6		16	1.3	1.1	0	0	5.1
	21	9.7	9.1	7.2	4.6	16.5		26	0	0	0	0	4.4
	31	8.7	8.1	5.6	5.3	16.4	Feb.	5	0	0	0	0	3.9
Feb.	10	7.7	7.2	5.0	3.7	16.4		15	0	0	0	0	4.1
	20	6.8	6.4	4.4	3.3	16.3		25	0	0.3	0.7	0.5	4.3
Mar.	2	5.8	5.5	3.9	2.9	16.2	Mar.	7	0.2	0.9	2.0	5.0	4.5
	12	4.9	4.7	3.4	2.5	16.2		17	0.5	1.5	3.3	3.7	4.5
	22	4.0	4.0	2.9	2.1	16.1		27	0.7	2.3	5.3	6.2	4.3
Apr.	1	3.2	3.2	2.4	1.8	16.0	Apr.	6	0	3.8	9.1	9.4	4.0
	11	2.3	2.5	1.9	1.4	15.9		16	6.0	8.3	10.0	9.9	4.4
	21	1.4	1.7	1.5	1.0	15.9		26	6.2	8.0	9.2	10.0	5.5
May	1	0.5	1.0	1.0	0.8	15.7	May	6	5.5	5.1	7.7	8.3	6.6
	11	0	0.3	0.5	0.2	15.6		16	2.7	4.3	6.7	7.3	7.5
	21	0	0	0	0	15.5		26	1.9	3.5	6.0	6.5	8.3
	31	0	0	0	0	15.3	Jun.	5	1.0	2.8	5.3	5.8	8.9
Jun.	10	0	0	0	0	15.1		15	0.2	2.1	4.6	5.1	9.4
	20	0	0	0	0	14.9		25	0	1.5	4.0	4.5	9.9
	30	0	0	0	0	14.7	Jul.	5	0	0.9	3.4	3.9	10.3
Jul.	10	0	0	0.3	0.1	14.5		15	0	0.4	2.7	3.2	10.7
	20	0	0.5	0.8	0.5	14.2		25	0	0	2.1	2.5	11.0
	30	0.5	1.2	1.3	0.9	13.9	Aug.	4	0	0	1.5	1.9	11.3
Aug.	9	1.4	1.9	1.7	1.3	13.6		14	0	0	0.9	1.2	11.6
	19	2.3	2.6	2.1	1.6	13.2		24	0	0	0.3	0.5	11.8
	29	3.2	3.3	2.5	1.9	12.8	Sep.	3	0	0	0	0	12.0
Sep.	8	4.1	4.0	2.9	2.2	12.4		13	0	0	0	0	12.2
	18	5.0	4.8	3.3	2.5	11.9		23	0	0	0	0	12.3
	28	5.9	5.6	3.8	2.8	11.3	Oct.	3	0	0	0	0	12.5
Oct.	8	6.9	6.4	4.3	3.1	10.7		13	0	0.1	0.4	0	12.6
	18	8.0	7.3	4.9	3.5	10.0		23	0.4	0.8	0.8	0.4	12.7
	28	9.2	8.5	5.7	4.1	9.1	Nov.	2	1.2	1.5	1.2	0.7	12.8
Nov.	7	10.7	10.0	6.8	5.0	8.2		12	2.0	2.2	1.7	1.0	12.9
	17	11.1	10.6	7.3	4.9	7.2		22	2.7	2.8	2.3	1.4	13.0
	27	10.6	9.8	7.0	4.2	6.5							
Dec.	7	7.7	7.1	4.4	3.6	6.3							
	17	5.5	5.1	2.8	1.0	6.2							
	27	3.9	3.6	1.5	0	6.0							

Note: (1) For a particular observer's latitude, the number of dark hours is defined as the time interval during which the Sun is below the local horizon by at least 18° and the comet is simultaneously above the local horizon.

(2) Magnitude estimates are based upon the comet's observed behavior in 1909–1910. Predictions are for ideal observing conditions.

Figures 9-13 are schematic representations as to how Comet Halley may appear on various dates for observers located at latitudes of 40°N, 30°N, 20°N, 20°S, and 30°S. The comet's elevation above the local horizon and its azimuth (degrees east of north) are given for various dates. For each date, the comet's position is given for the end of astronomical twilight if the comet is in the evening sky, or the beginning of astronomical twilight if the comet is in the morning sky. These positions correspond to times approximately 70–90 minutes after sunset or 70–90 minutes before sunrise. Very rough indications of the comet's tail length and orientation are given for a few representative dates along with the comet's apparent total magnitude, M_1, in parentheses. The tail-length estimates presented in Figures 9-13 were obtained by solving for t in formula (5) and using the data in Figure 7 and Appendix B. The tail orientation is always antisolar in Figures 9-13, which cover the period when the comet is brightest (January–April 1986). Note that since the comet passes near opposition in April 1986, it is observable as both an evening and a morning object for some latitudes.

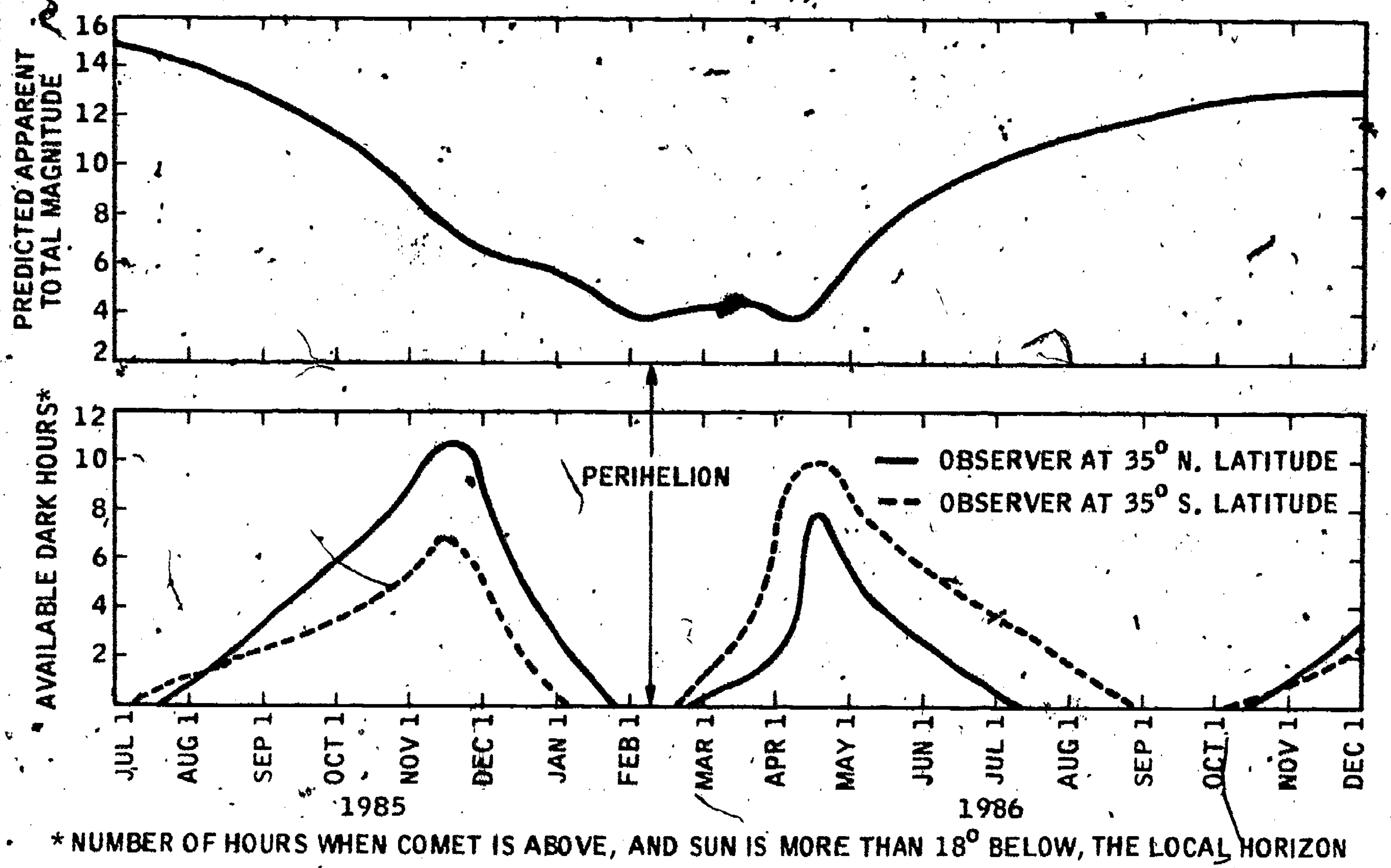


Fig. 8. Comet Halley 1985–1986 Ground-Based Observing Conditions.

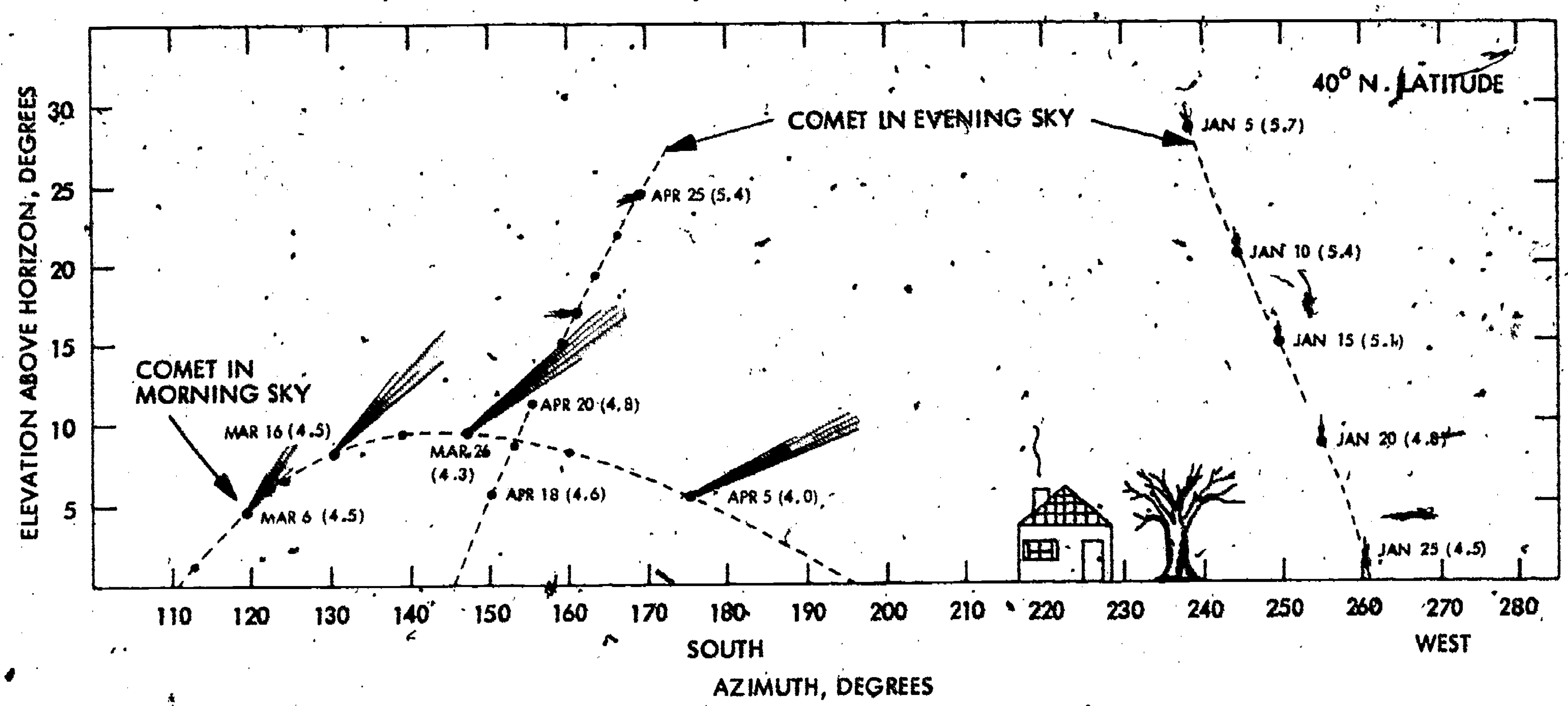


Fig. 9. Comet Halley Observing Conditions in 1986 for Observers Located at 40° North Latitude. Comet positions are given for beginning of morning astronomical twilight or end of evening astronomical twilight. Approximate total visual magnitudes are given in parentheses following dates. Viewing with binoculars and ideal observing conditions are assumed.

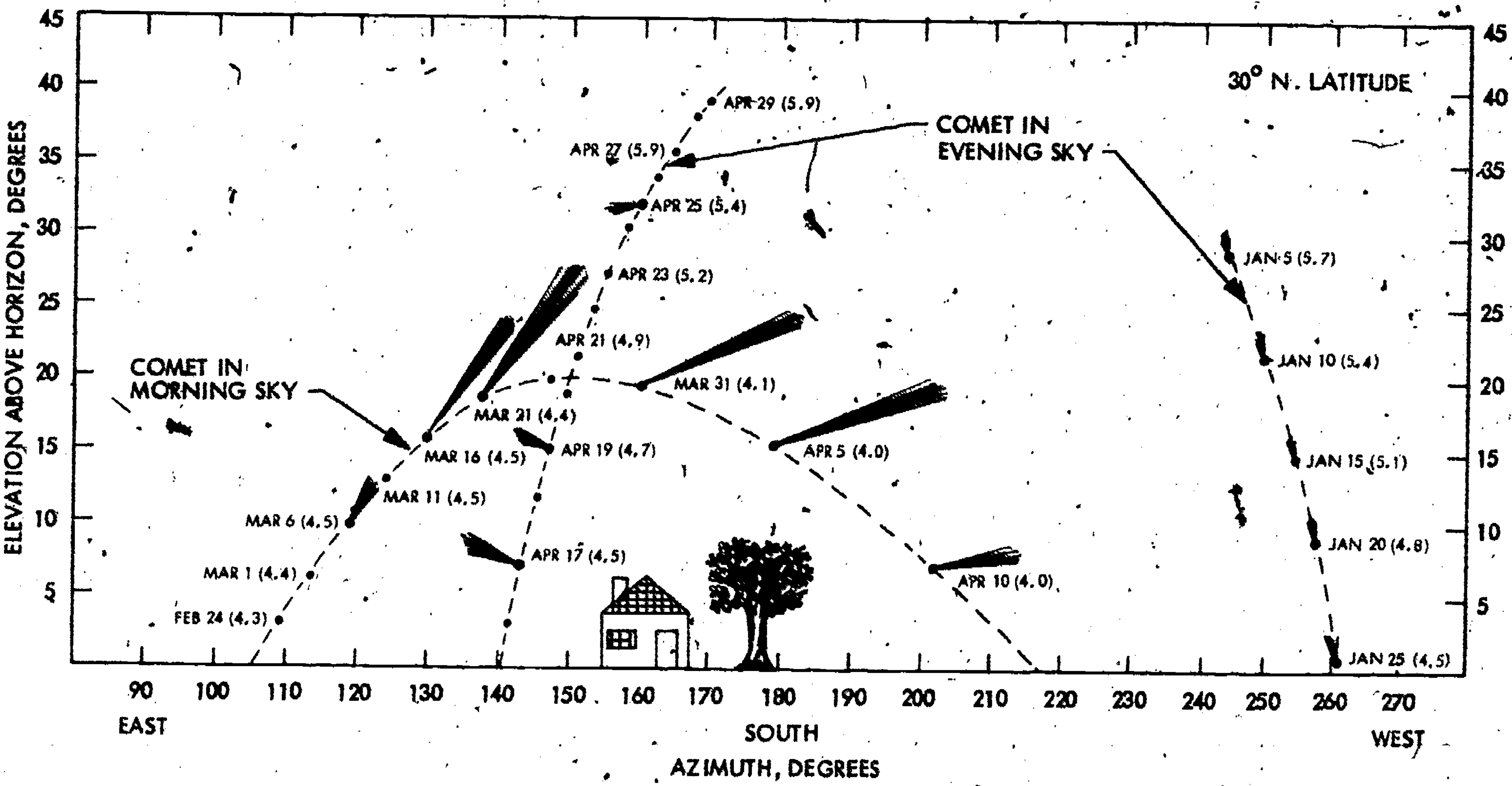


Fig. 10. Comet Halley Observing Conditions in 1986 for Observers Located at 30° North Latitude. Comet positions are given for beginning of morning astronomical twilight or end of evening astronomical twilight. Approximate total visual magnitudes are given in parentheses following dates. Viewing with binoculars and ideal observing conditions are assumed.

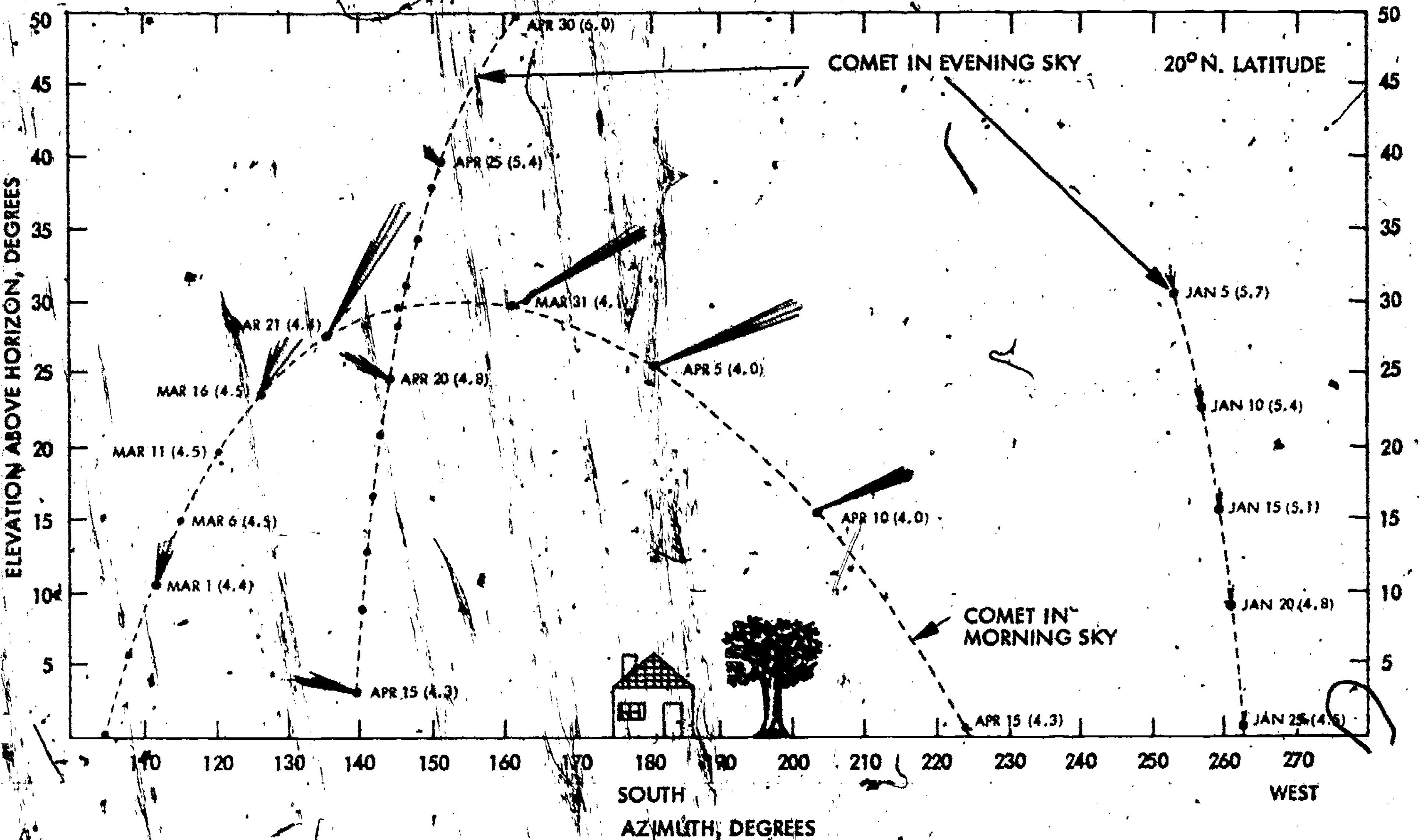


Fig. 11. Comet Halley Observing Conditions in 1986 for Observers Located at 20° North Latitude. Comet positions are given for beginning of morning astronomical twilight or end of evening astronomical twilight. Approximate total visual magnitudes are given in parentheses following dates. Viewing with binoculars and ideal observing conditions are assumed.

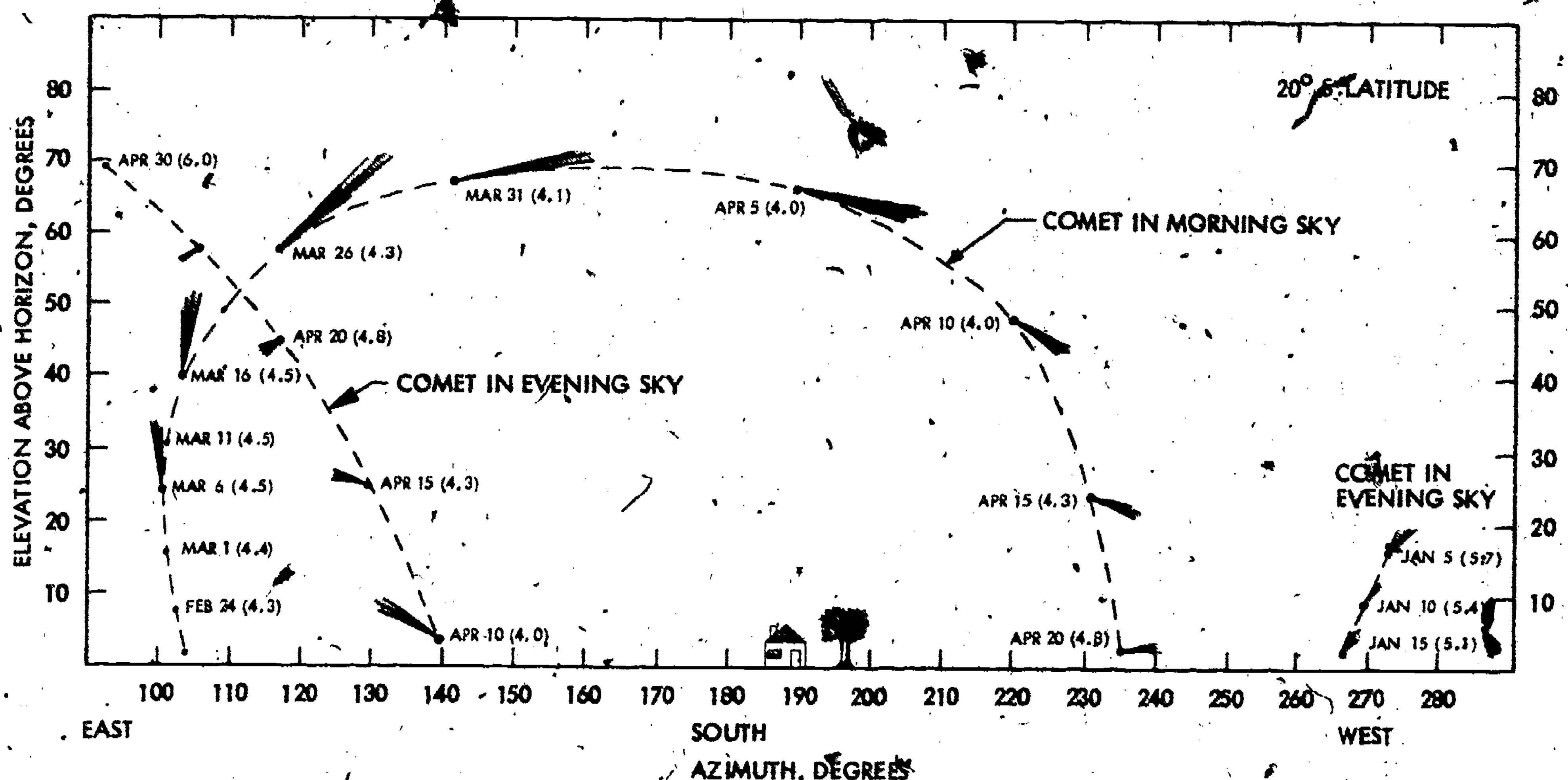


Fig. 12. Comet Halley Observing Conditions in 1986 for Observers Located at 20° South Latitude. Comet positions are given for beginning of morning astronomical twilight or end of evening astronomical twilight. Approximate total visual magnitudes are given in parentheses following dates. Viewing with binoculars and ideal observing conditions are assumed.

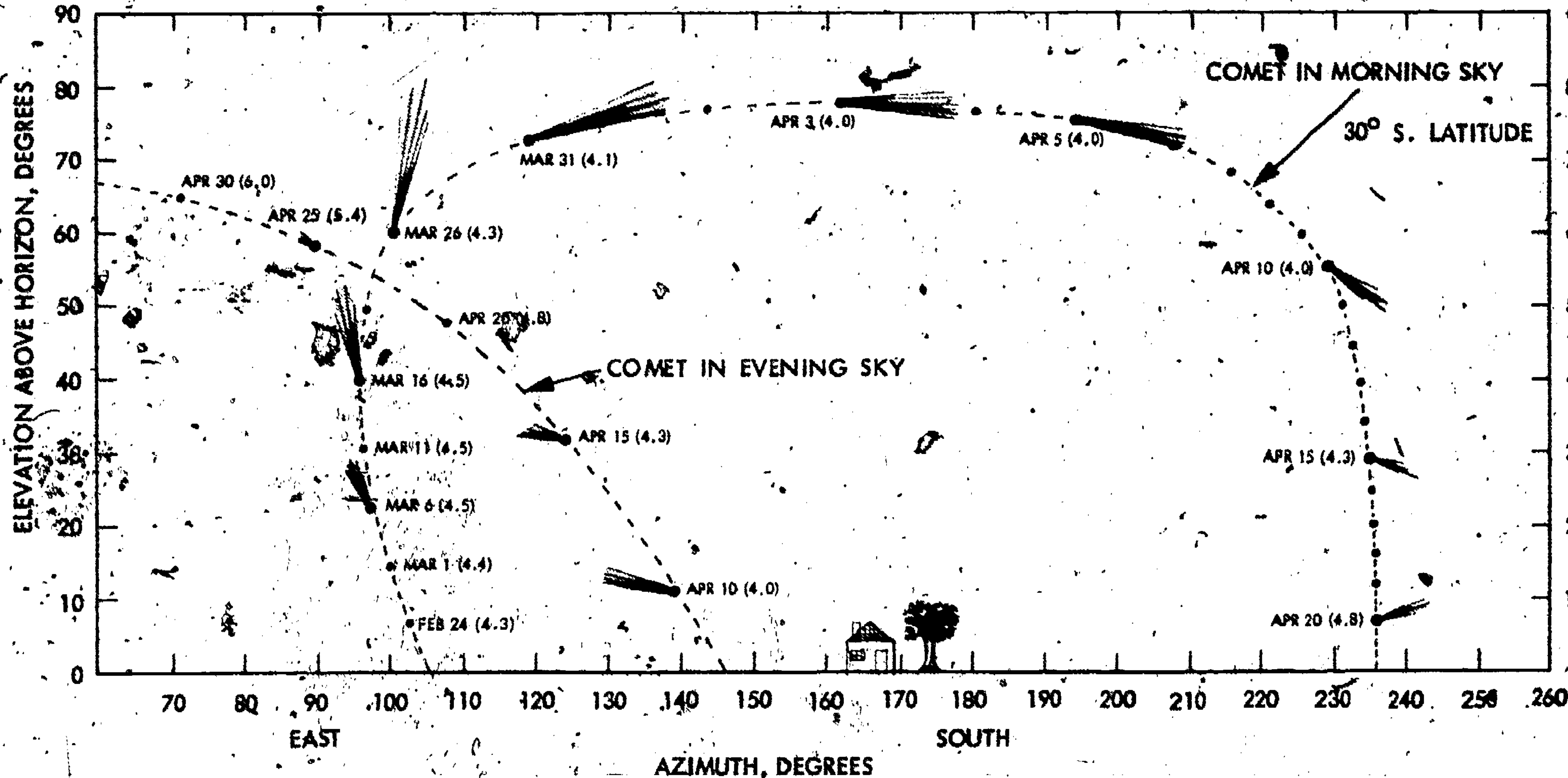


Fig. 13. Comet Halley Observing Conditions in 1986 for Observers Located at 30° South Latitude. Comet positions are given for beginning of morning astronomical twilight or end of evening astronomical twilight. Approximate total visual magnitudes are given in parentheses following dates. Viewing with binoculars and ideal observing conditions are assumed.

IV. Observing Conditions for the Dust Tail of Comet Halley in 1985–1986

Since the dust tail represents a relatively thin layer of material extending in a comet's orbit plane between the prolonged radius vector and the direction behind the comet on the convex side of the orbit, its appearance is affected by both the level of dust production and the projection conditions for the observer. The amount of scientific information that can be extracted by applying the existing methods of dust-particle dynamics increases generally with the tail's apparent width. Usually more pronounced after perihelion due to cumulative effects of the differential angular momentum, the projected width of the tail in the sky is strongly dependent on the Earth's cometocentric latitude, that is, on the angle that the comet-Earth vector makes with the comet's orbit plane. The variation of this angle during the upcoming apparition of Comet Halley is displayed in Figure 14.

With the possible exception of a few days around November 10, 1985, the dust tail will remain very narrow, straight, and rather uninteresting until the comet disappears in the Sun's glare in late January 1986. Shortly before perihelion the tail will begin to broaden, but because of the proximity to the Sun in the sky this development will be unobservable except possibly with very sensitive infrared detectors. By the time the comet emerges from the Sun's rays in the second half of February, the dust ejecta will discriminate into two branches bounded on their opposite sides by sharp boundaries: freshly-emitted microscopic dust will form an ordinary tail, whereas large particles, released long before perihelion, will make up an antitail. The antitail will be fainter and shorter and may not be detected (especially by visual observers) until the comet's elongation from the Sun has increased to the point that the ambient sky is sufficiently dark. In and near major metropolitan areas the antitail may never become visible. The tail's width will decrease rapidly from mid-April on, reaching a minimum around May 20, when the Earth crosses the comet's orbit plane. The most favorable projection conditions for the tail will occur in early April, as the Earth's cometocentric latitude reaches a peak of 28° on April 7 and the comet-Earth distance reaches its minimum on April 11. Unlike the sunward tail seen in April 1957 when the Earth passed through the orbit plane of Comet Arend-Roland, no sunward tail will be seen for Comet Halley when the Earth crosses Halley's orbit plane on November 21, 1985, and May 20, 1986.

To demonstrate in a more quantitative fashion the expected appearance of the dust tail on high-quality photographs under near ideal conditions, Table 3 lists for a number of dates: 1) the position angle (P.A., reckoned from the north through the east)

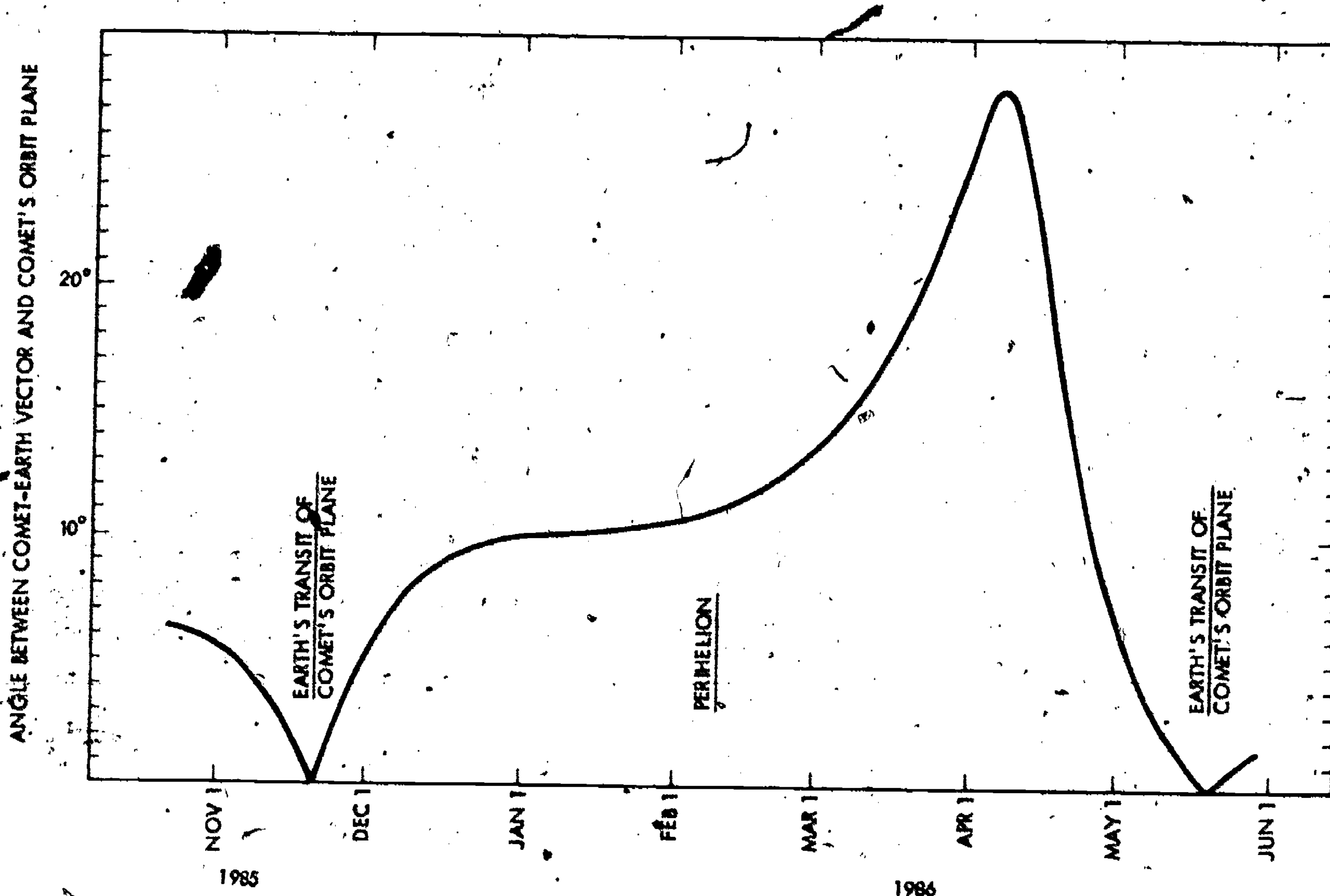


Fig. 14. Angle Between the Comet Halley-Earth Vector and the Comet's Orbit Plane Plotted Against Calendar Date.

Table 3. The Orientation and Width of the Dust Tail of Comet Halley in 1985–1986.

Date 1985/6 0^h UT	Position Angle: Leading Boundary	Position Angle: Trailing Boundary	Tail's Sector Angle	Date 1986 0^h UT	Position Angle: Leading Boundary	Position Angle: Trailing Boundary	Tail's Sector Angle
Nov. 21*	91°	91°	0°	Feb. 14	278°	82°	144°
26	79	81	2	19	268	60	152
Dec. 1	73	75	2	24	263	57	154
				Mar. 1	260	54	154
11	68	70	2				
21	66	69	3	11	258	48	150
31	64	69	5	21	258	43	145
Jan. 10	61	68	7	31	287	48	141
20	56	67	11				
				Apr. 5	283	59	136
25	50	67	17	10	315	80	125
30	39	66	27	15	4	101	97
				20	54	111	57
Feb. 1	30	66	36	25	81	113	32
3	16	65	49	30	93	113	20
5	356	65	69				
7	329	64	95	May 10	103	[illegible]	7
9	307	64	117	20*	108	108	0

*Transit of the comet's orbit plane by the Earth.

of the prolonged Sun-comet radius vector, essentially defining the tangent at the nucleus to the tail's sharp, leading boundary, 2) the P.A. of the diffuse, trailing boundary (or the sharp boundary of the antitail), approximated, somewhat arbitrarily, by an assumed onset of the production of detectable dust ejecta at 2 AU before perihelion, and 3) the maximum expected tail width, or sector angle, at the nucleus given by the difference between the two directions. A sector angle noticeably exceeding 90° implies the presence of an antitail.

The tail's calculated outlines are provided for two specific times of particular interest: for March 13, the encounter date of the European Space Agency's Giotto spacecraft, and for April 10, around the time of the most favorable viewing conditions. These predictions are based on the production curve of R. L. Newburn, Jr.,[7] on the assumption of negligibly small ejection velocities, and on an assumed dust size-distribution function, which has a particle-radius cutoff at 0.1 μm, peaks sharply in the submicron size range, and varies as an inverse 4.2 power of the size for all particles larger than several tens of microns.

The predicted brightness contours for March 13, 1986, are shown in Figure 15 for an assumed peak particle size of 0.41 μm. The ordinary tail is seen to point to the west, the antitail to the northeast. In the order of their increasing density, the three hatched areas represent the portions of the tail calculated to be brighter than, respectively, 10%, 20%, and 40% the intensity of the "dark" sky. The curves marked with unsubscripted numbers are syndynames, or the loci of particles subjected to the same repulsive acceleration by solar radiation pressure (0.15 means, for example, that the acceleration amounts to 15% of the solar attraction). The curves marked with subscripted numbers are synchrones, or the loci of particles ejected simultaneously from the comet at the indicated heliocentric distances: subscript b stands for the ejections before perihelion, and subscript a for the ejections after perihelion (2.5_b means, for example, ejection at 2.5 AU before perihelion). The curve marked q is the perihelion synchrone.

Figure 16 shows the calculated contours of the tail for April 10, 1986. It illustrates the dependence of the brightness-distribution models on the assumed peak particle size. Note the decreasing width of the calculated tail as the peak size drops from 0.41 μm (Model 1) to 0.28 μm (Model 2). After March 13 the expected apparent length of the ordinary tail will have nearly doubled and its curvature increased, but the antitail will have become relatively less conspicuous. Note also that the synchrone 0.9_a, corresponding closely to the Giotto spacecraft encounter date, runs through the densest part of the tail, so that the *in situ* dust measurements and the ground-based observations of the tail will complement each other and facilitate the interpretation of the comet's dust tail.

The dust-tail development in early and mid-November 1985, shortly before the Earth transits the comet's orbit plane (Nov. 21.0 UT), deserves special attention. Some three days before the transit the comet will be at opposition with the Sun, passing only 2° north of the antisolar point in the sky. The direction and appearance of the dust tail in the period of time immediately preceding the opposition should be very sensitive to the comet's dust production rate at large heliocentric distances. Assuming that the dust production rate varies as an inverse cube of the distance from the Sun (out to at least 4 AU), the dust tail should show up on deep photographs taken at this time. (A short, inconspicuous dust tail may be detectable in October or even sooner, pointing generally to the west of the comet.) The tail will be directed slightly to the south of west in early November, until about November 8. For the following few days the comet may show two very faint tails, one directed to the west-southwest, the other developing in the southeast and gradually growing in length. By November 14 the westerly tail will disappear, and the easterly tail will rotate slowly to

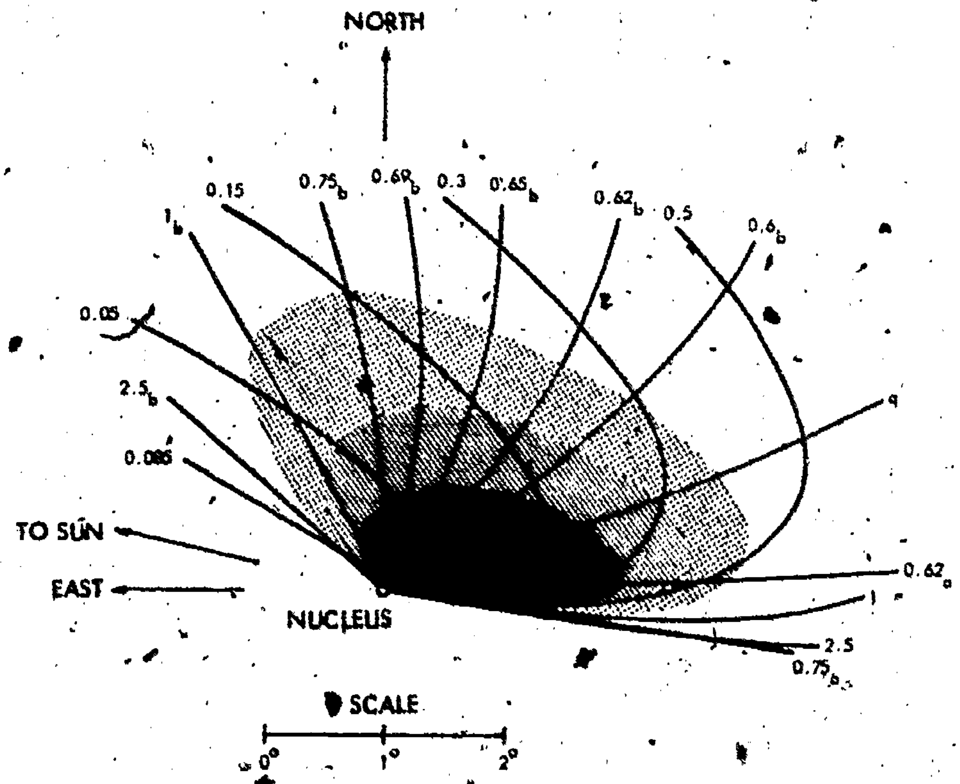


Fig. 15. Predicted Brightness Profile of the Dust Tail of Comet Halley on March 13, 1986, the Encounter Date of the Giotto Spacecraft. The outermost contour gives a 10% contrast level relative to the ambient sky brightness, the middle contour gives a 20% level, and the inner contour 40%. The ordinary tail points to the west, the antitail to the northeast. The curves marked with unsubscripted numbers are syndynames, the curves with subscripted numbers are synchrones (b indicates dust ejection before perihelion while a indicates ejection after perihelion). The curve labeled q is the perihelion synchrone.

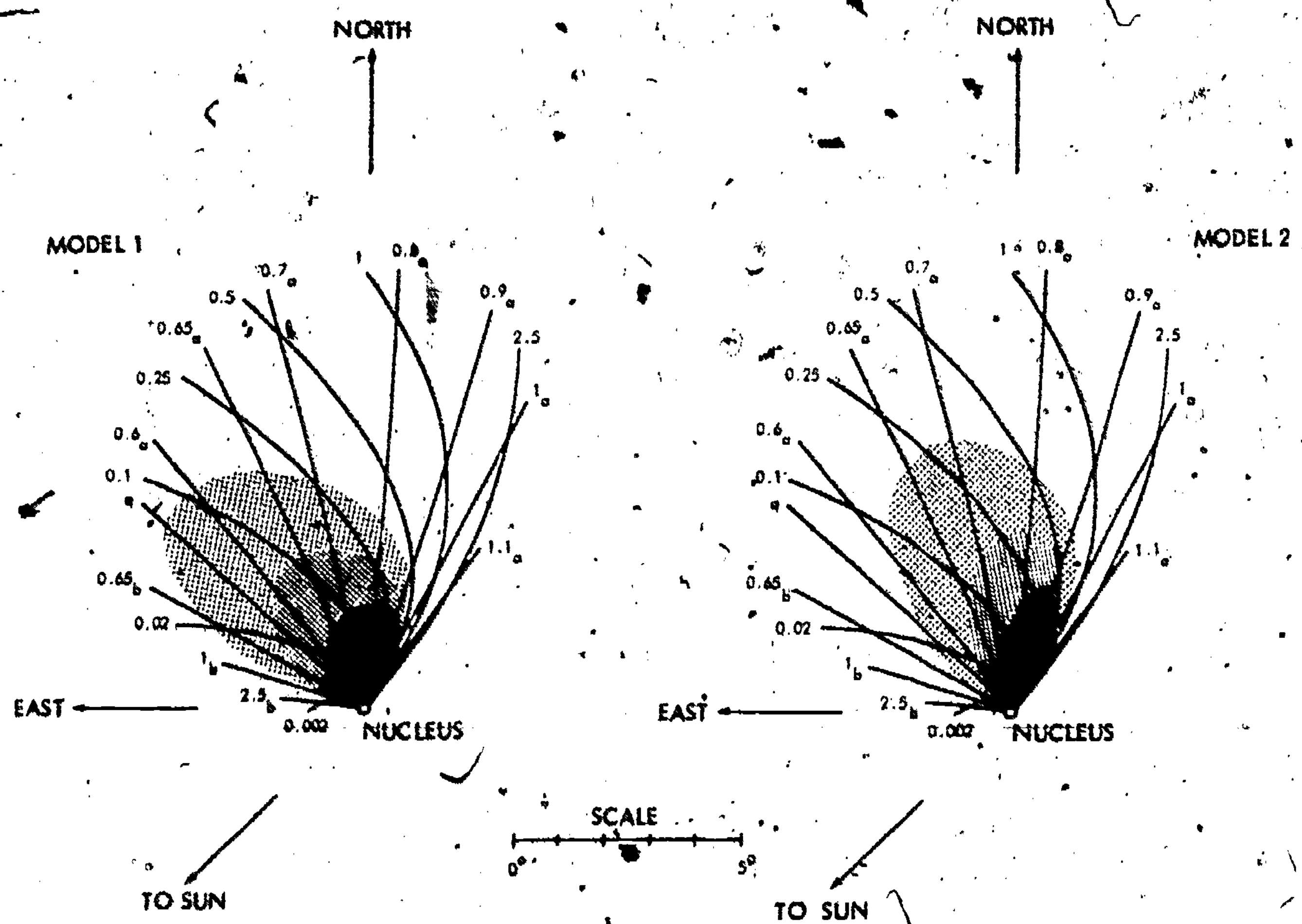


Fig. 16. Predicted Brightness Profiles of the Dust Tail of Comet Halley on April 10, 1986. The two diagrams show the dependence on the assumed dust size distribution function, which peaks at a particle radius of 0.41 μm for Model 1, but at 0.28 μm for Model 2. The curve labels are the same as those in Fig. 15.

reach a $P.A.$ of almost exactly 90° by the time of the transit on November 21 (see Table 3). If the dust production varies more steeply at distances greater than 2 AU from the Sun pre-perihelion, the dust tail may not show up until late November or December.

To a visual observer equipped with a small telescope, the tail's sector-angle estimates in Table 3 and the calculated widths in Figures 15 and 16 will probably be mostly crude upper limits. Since the perception of a nonstellar object by the human eye is strongly contrast-dependent, the visually apparent features of Halley's dust tail will be the portions with a steep contrast gradient, primarily the leading boundary of the ordinary tail and possibly the trailing boundary of the antitail. The two branches will appear detached from each other and narrower than indicated by the isophotes. Because of the tail's curvature after perihelion, it is imperative that each visual measurement of the tail's P.A. specify to what angular distance from the nucleus it refers.

Paradoxically, the observing conditions for Halley's dust tail will be more favorable in the upcoming apparition than they were in 1910, although the tail's appearance will be considerably less impressive. It is essential that professional and amateur astronomers who wish to contribute to the understanding of the nature of cometary dust exploit the opportunity to the fullest by systematically photographing the dust tail with proper equipment. This includes a fast, wide-field camera, a panchromatic emulsion, a red filter (to block the interference from the plasma tail), and a photometric calibration of the plates. If available, a charge-coupled device (CCD) detector can be attached to a camera of short focal length (to avoid complicated mosaic exposures) to obtain tail images of considerable value.

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APPENDIX A
HISTORICAL, PHYSICAL, AND ORBITAL DATA

Historical Data

Earliest probable recorded apparition	240 B.C.
Number of recorded apparitions from 240 B.C. to 1986 A.D. (only the 164 B.C. apparition was not recorded).	29
Shortest period between returns to perihelion	74.42 years (1835–1910)
Longest period between returns to perihelion	79.25 years (451–530)
Closest approach to the earth	0.033 AU (April 10, 837)
Longest angular tail length recorded (nucleus to end of tail)	150° (May 20, 1910)
Brightest apparent magnitude recorded (approximate)	−3.5 (April 10, 837)

Physical Characteristics

Estimated diameter of nucleus	5 km
Estimated density of nucleus	1 g/cm^3
Estimated rotation period[A-1]	10.3 hours, direct
Observed chemical species in 1910[A-2]	CH, CN, C_2, C_3, Na, CO^+, N_2^+
Observed tails	Type I ion and Type II dust
Associated meteor streams	η Aquarid (early May) and Orionid (late October)

Orbital Characteristics

Location of orbit pole	$\lambda = \Omega - 90° = 328.15°$ $\beta = 90° - i = -72.24°$
Location of perihelion	$\lambda = \Omega + \tan^{-1}\left[\frac{\sin\omega\cos i}{\cos\omega}\right]$ $= 305.31°$ $\beta = \sin^{-1}(\sin\omega\sin i) = 16.45°$

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Heliocentric distance of orbit nodes	$r(\Omega) = q(1 + e)/(1 + e \cos \omega)$ $= 1.80$ AU $r(\mho) = q(1 + e)/(1 - e \cos \omega)$ $= 0.85$ AU
Distance of perihelion and aphelion above or below orbit plane (in AU)	$Z(q) = q \sin \omega \sin i = 0.17$ AU $Z(Q) = Q \sin \omega \sin i = 9.99$ AU
Orbital velocity (in km/s)	$V = 29.8\left[\frac{2}{r} - \frac{1}{a}\right]^{1/2}$ $= 29.8\left[\frac{2}{r} - 0.0357\right]^{1/2}$
At perihelion $r = q$	$V = 54.55$ km/s
At aphelion $r = Q$	$V = 0.91$ km/s

Definitions

λ, β	ecliptic longitude, latitude
$\Omega, \mho$	longitude of the ascending, descending node
ω	argument of perihelion
i	inclination of orbit plane with respect to the ecliptic
q, Q	perihelion, aphelion distance in AU
e	orbital eccentricity
a	semimajor axis in AU

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A-1. Whipple, F. L. (1980). Periodic Comet Halley. *International Astronomical Union Circular*, no. 3459, dated March 13, 1980.

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APPENDIX B.
EPHEMERIS DATA 1982–1987

EXPLANATION OF SYMBOLS

J.D.	= Julian Date (Ephemeris Time)
R.A. (1950.0) DEC.	= Geocentric right ascension and declination referred to the mean equator and equinox of 1950.0. A light time correction has been applied.
R.A. (APPN) DEC.	= Apparent geocentric right ascension and declination. Light time, annual aberration, and nutation corrections have been applied, and R.A. and Dec. have been precessed to the ephemeris date.
DELTA	= Geocentric distance of comet in AU
DELDOT	= Geocentric velocity of comet in km/s
R	= Heliocentric distance of comet in AU
RDOT	= Heliocentric velocity of comet in km/s
M_1	= Total magnitude = 5.47 + 5.0 log (DELTA) + 11.1 log (R), (pre-perihelion). Post-perihelion the corresponding equation is total magnitude = 4.94 + 5.0 log (DELTA) + 7.68 log (R).
M_2	= Nuclear magnitude = 14.1 + 5.0 log (DELTA) + 5.0 log (R)
NOTE:	In cases where M_1 is not computed, the corresponding column is filled with zeros (0.0).
THETA	= Sun-Earth-Comet angle in degrees
BETA	= Sun-Comet-Earth angle in degrees
MOON	= Comet-Earth-Moon angle in degrees

NOTES: 1. These osculating orbital elements are consistent with the following ephemeris:

Epoch	2446480.50	1986	Feb.	19.0 (E.T.)
Perihelion Passage	2446470.95175	1986	Feb.	9.45175 (E.T.)
Perihelion Distance in AU	0.5871047			
Eccentricity	0.9672760			
Argument of Perihelion in deg.	111.84809			
Longitude of Ascending Node in deg.	58.14536			
Inclination in deg.	162.23928			

2. The angular elements are referred to the ecliptic and equinox of 1950.0.

3. The style II nongravitational parameters [B-1] are:

$$A_1 = (0.0565 \pm 0.0213) \times 10^{-8} \text{ AU/day}^2$$

$$A_2 = (0.0154 \pm 0.0001) \times 10^{-8} \text{ AU/day}^2$$

Reference

B-1. Marsden, B.G., Z. Sekanina, and D. K. Yeomans (1973). Comets and Nongravitational Forces V. *Astronomical Journal*, v. 78, p. 211.

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Table B-1. Ephemeris (with Perturbations) for Comet Halley at Five-Day Intervals from July 24, 1982, to August 7, 1984.

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1982	7	24	.0	2445174.5	6 56.857	+10 52.85	7 .620	+10 50.10	12.49	-17.76	11.53	-9.85	.0	24.9	19.5	1.7	60
1982	7	29	.0	2445179.5	7 .218	+10 49.85	7 1.981	+10 [illegible].04	12.43	-19.9[illegible]	11.50	-9.87	.0	24.9	23.1	2.0	123
1982	8	3	.0	2445184.5	7 1.541	+10 46.49	7 3.306	+10 [illegible]3.82	12.37	-22.0[illegible]	11.48	-9.89	.0	24.9	27.0	2.3	167
1982	8	8	.0	2445189.5	7 2.819	+10 42.79	7 4.584	+10 39.87	12.30	-24.12	11.45	-9.90	.0	24.8	31.1	2.6	114
1982	8	13	.0	2445194.5	7 4.044	+10 38.78	7 5.809	+10 35.81	12.23	-26.10	11.42	-9.92	.0	24.8	35.2	2.9	50
1982	8	18	.0	2445199.5	7 5.205	+10 34.48	7 6.971	+10 31.48	12.15	-28.01	11.39	-9.94	.0	24.8	39.5	3.2	26
1982	8	23	.0	2445204.5	7 6.293	+10 29.91	7 8.060	+10 26.85	12.07	-29.[illegible]	11.36	-9.96	.0	24.8	43.8	3.5	93
1982	8	28	.0	2445209.5	7 7.299	+10 25.12	7 9.066	+10 22.01	11.98	-3[illegible].48	11.33	-9.97	.0	24.8	48.2	3.8	152
1982	9	2	.0	2445214.5	7 8.214	+10 20.12	7 9.982	+10 16.98	11.89	-[illegible]3.01	11.30	-9.99	.0	24.7	52.6	4.1	143
1982	9	7	.0	2445219.5	7 9.029	+10 14.96	7 10.799	+10 11.78	11.79	-[illegible]4.42	11.27	-10.01	.0	24.7	57.1	4.3	81
1982	9	12	.0	2445224.5	7 9.738	+10 9.67	7 11.508	+10 6.46	11.69	-[illegible]5.69	11.25	-10.03	.0	24.7	61.6	4.5	17
1982	9	17	.0	2445229.5	7 10.330	+10 4.30	7 12.101	+10 1.06	11.58	-36.80	11.22	-10.05	.0	24.7	66.2	4.7	60
1982	9	22	.0	2445234.5	7 10.796	+ 9 58.87	7 12.568	+ 9 58.61	11.48	-37.72	11.19	-1[illegible].06	.0	24.6	70.8	4.9	124
1982	9	27	.0	2445239.5	7 11.128	+ 9 53.43	7 12.902	+ 9 50.16	11.37	-38.45	11.16	-10.08	.0	24.6	75.5	5.0	165
1982	10	2	.0	2445244.5	7 11.321	+ 9 48.04	7 13.095	+ 9 44.76	11.25	-38.99	11.13	-10.10	.0	24.6	80.3	5.1	111
1982	10	7	.0	2445249.5	7 11.366	+ 9 42.74	7 13.142	+ 9 39.44	11.14	-39.33	11.10	-10.[illegible]2	.0	24.6	85.0	5.1	45
1982	10	12	.0	2445254.5	7 11.259	+ 9 37.56	7 13.037	+ 9 34.27	11.03	-39.47	[illegible].07	-10.[illegible]4	.0	24.5	89.9	5.2	30
1982	10	17	.0	2445259.5	7 10.992	+ 9 32.57	7 12.772	+ 9 29.28	10.91	-39.38	11.04	-10.1[illegible]	.0	24.5	94.8	5.2	95
1982	10	22	.0	2445264.5	7 10.562	+ 9 2[illegible].80	7 12.343	+ 9 24.53	10.80	-39.04	11.01	-10.1[illegible]	.0	24.5	99.7	5.1	154
1982	10	27	.0	2445269.5	7 9.964	+ 9 2[illegible].32	7 11.747	+ 9 20.07	10.69	-38.48	10.98	-10.1[illegible]	.0	24.4	104.7	5.0	139
1982	11	1	.0	2445274.5	7 9.199	+ 9 19.18	7 10.983	+ 9 15.95	10.58	-37.68	10.95	-10.21	.0	24.4	109.7	4.9	76
1982	11	6	.0	2445279.5	7 8.265	+ 9 15.40	7 10.052	+ 9 12.21	10.47	-36.66	10.92	-10.23	.0	24.4	114.8	4.7	14
1982	11	11	.0	2445284.5	7 7.164	+ 9 12.05	7 8.953	+ 9 8.91	10.37	-35.41	10.89	-10.25	.0	24.4	119.9	4.5	66
1982	11	16	.0	2445289.5	7 5.898	+ 9 9.17	7 7.669	+ 9 6.07	10.27	-33.92	10.86	-10.27	.0	24.3	125.0	4.3	129
1982	11	21	.0	2445294.5	7 4.471	+ 9 6.80	7 6.264	+ 9 3.76	10.17	-32.2[illegible]	10.83	-10.29	.0	24.3	130.2	4.0	161
1982	11	26	.0	2445299.5	7 2.892	+ 9 4.98	7 4.688	+ 9 2.00	10.08	-30.27	10.81	-10.31	.0	24.3	135.3	3.7	106
1982	12	1	.0	2445304.5	7 1.171	+ 9 3.74	7 2.968	+ 9 .83	10.00	-28.15	10.78	-10.33	.0	24.3	140.4	3.3	39
1982	12	6	.0	2445309.5	6 59.317	+ 9 3.10	7 1.118	+ 9 .27	9.92	-25.86	10.75	-10.35	.0	24.2	145.5	3.0	39
1982	12	11	.0	2445314.5	6 57.345	+ 9 3.09	6 59.147	+ 9 .34	9.85	-23.40	10.72	-10.37	.0	24.2	150.5	2.6	104
1982	12	16	.0	2445319.5	6 55.268	+ 9 3.72	6 57.073	+ 9 1.05	9.78	-20.79	10.69	-10.39	.0	24.2	155.3	2.2	160
1982	12	21	.0	2445324.5	6 53.105	+ 9 5.01	6 54.912	+ 9 2.43	9.73	-18.06	10.66	-10.41	.0	24.2	159.6	1.8	131
1982	12	26	.0	2445329.5	6 50.875	+ 9 6.94	6 52.684	+ 9 4.46	9.68	-15.26	10.63	-10.4[illegible]	.0	24.2	163.3	1.5	70
1982	12	31	.0	2445334.5	6 48.599	+ 9 9.52	6 50.410	+ 9 7.13	9.64	-12.42	10.60	-10.45	.0	24.1	165.7	1.3	15
1983	1	5	.0	2445339.5	6 46.297	+ 9 12.72	6 48.110	+ 9 10.44	9.61	-9.55	10.57	-10.47	.0	24.1	166.1	1.3	78
1983	1	10	.0	2445344.5	6 43.989	+ 9 16.52	6 45.803	+ 9 14.34	9.58	-6.67	10.53	-10.49	.0	24.1	164.4	1.4	140
1983	1	15	.0	2445349.5	6 41.698	+ 9 20.90	6 43.515	+ 9 18.82	9.57	-3.82	10.50	-10.51	.0	24.1	161.0	1.7	153
1983	1	20	.0	2445354.5	6 39.447	+ 9 25.83	6 41.265	+ 9 23.85	9.56	-1.05	10.[illegible]7	-10.53	.0	24.1	156.8	2.1	96
1983	1	25	.0	2445359.5	6 37.257	+ 9 31.26	6 39.076	+ 9 29.38	9.56	1.61	10.44	-10.55	.0	24.1	152.1	2.5	32
1983	1	30	.0	2445364.5	6 35.147	+ 9 37.14	6 36.968	+ 9 35.36	9.57	4.13	10.41	-10.57	.0	24.1	147.2	2.9	47
1983	2	4	.0	2445369.5	6 33.136	+ 9 43.42	6 34.957	+ 9 41.73	9.59	6.52	10.38	-10.59	.0	24.1	142.1	3.3	116
1983	2	9	.0	2445374.5	6 31.239	+ 9 50.06	6 33.062	+ 9 48.45	9.61	8.74	10.35	-10.62	.0	24.1	137.0	3.7	166
1983	2	14	.0	2445379.5	6 29.474	+ 9 57.00	6 31.297	+ 9 55.48	9.64	10.77	10.32	-10.64	.0	24.1	131.8	4.1	120
1983	2	19	.0	2445384.5	6 27.854	+10 4.18	6 29.677	+10 2.74	9.67	12.58	10.29	-10.66	.0	24.1	126.6	4.4	59
1983	2	24	.0	2445389.5	6 26.389	+10 11.56	6 28.214	+10 10.18	9.71	14.16	10.26	-10.68	.0	24.1	121.4	4.7	17
1983	3	1	.0	2445394.5	6 25.089	+10 19.06	6 26.914	+10 17.75	9.75	[illegible]5.50	10.23	-10.70	.0	24.1	116.2	5.0	86
1983	3	6	.0	2445399.5	6 23.959	+10 26.64	6 25.784	+10 25.38	9.80	16.63	10.20	-10.72	.0	24.1	111.1	5.2	149
1983	3	11	.0	2445404.5	6 23.004	+10 34.25	6 24.830	+10 33.04	9.85	17.51	10.17	-10.75	.0	24.1	106.0	5.4	145
1983	3	16	.0	2445409.5	6 22.228	+10 41.83	6 24.054	+10 40.66	9.90	18.15	10.14	-10.77	.0	24.1	100.9	5.5	86
1983	3	21	.0	2445414.5	6 21.632	+10 49.34	6 23.458	+10 48.20	9.95	18.54	10.10	-10.79	.0	24.1	95.8	5.6	23
1983	3	26	.0	2445419.5	6 21.215	+10 56.72	6 23.042	+10 55.60	10.01	18.68	10.07	-10.81	.0	24.1	91.0	5.7	52
1983	3	31	.0	2445424.5	6 20.974	+11 3.94	6 22.800	+11 2.83	10.06	18.61	10.04	-10.83	.0	24.1	86.1	5.7	121
1983	4	5	.0	2445429.5	6 20.90[illegible]	+11 10.95	6 22.731	+11 9.84	10.11	18.33	10.01	-10.86	.0	24.1	81.3	5.7	165
1983	4	10	.0	2445434.5	6 21.003	+11 17.71	6 22.830	+11 16.61	10.17	17.84	9.98	-10.88	.0	24.1	76.5	5.6	113
1983	4	15	.0	2445439.5	6 21.265	+11 24.20	6 23.091	+11 23.08	10.22	17.15	9.95	-10.90	.0	24.1	71.7	5.5	51
1983	4	20	.0	2445444.5	6 21.683	+11 30.37	6 23.509	+11 29.23	10.27	16.22	9.92	-10.92	.0	24.1	67.1	5.4	22
1983	4	25	.0	2445449.5	6 22.248	+11 36.19	6 24.075	+11 35.04	10.31	15.13	9.89	-10.95	.0	24.1	62.4	5.2	89

Table B-1 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1983	4	30	.0	2445454.5	6 22.953	+11 41.64	6 24.780	+11 40.45	10.35	13.90	9.85	-10.97	.0	24.1	57.9	5.0	153
1983	5	5	.0	2445459.5	6 23.790	+11 46.70	6 25.618	+11 45.48	10.39	12.51	9.82	-10.99	.0	24.1	53.3	4.7	141
1983	5	10	.0	2445464.5	6 24.750	+11 51.34	6 26.578	+11 50.08	10.42	10.98	9.79	-11.02	.0	24.1	48.9	4.5	82
1983	5	15	.0	2445469.5	6 25.825	+11 55.55	6 27.653	+11 54.23	10.45	9.30	9.76	-11.04	.0	24.1	44.5	4.2	18
1983	5	20	.0	2445474.5	6 27.005	+11 59.30	6 28.834	+11 57.94	10.48	7.50	9.73	-11.07	.0	24.1	40.1	3.8	58
1983	5	25	.0	2445479.5	6 28.279	+12 2.58	6 30.108	+12 1.16	10.50	5.62	9.69	-11.09	.0	24.1	35.8	3.5	124
1983	5	30	.0	2445484.5	6 29.639	+12 5.39	6 31.468	+12 3.91	10.51	3.65	9.66	-11.11	.0	24.1	31.6	3.2	165
1983	6	4	.0	2445489.5	6 31.074	+12 7.71	6 32.903	+12 6.17	10.52	1.61	9.63	-11.14	.0	24.1	27.5	2.8	112
1983	6	9	.0	2445494.5	6 32.575	+12 9.54	6 34.[illegible]05	+12 7.93	10.52	-.52	9.60	-11.16	.0	24.1	23.6	2.4	50
1983	6	14	.0	2445499.5	6 34.134	+12 10.87	6 35.965	+12 9.19	10.52	-2.70	9.57	-11.19	.0	24.1	19.8	2.1	25
1983	6	19	.0	2445504.5	6 35.738	+12 11.70	6 37.570	+12 9.95	10.50	-4.93	9.53	-11.21	.0	24.1	16.3	1.7	93
1983	6	24	.0	2445509.5	6 37.378	+12 12.03	6 39.210	+12 10.20	10.49	-7.17	9.50	-11.24	.0	24.1	13.4	1.4	154
1983	6	29	.0	2445514.5	6 39.044	+12 11.86	6 40.877	+12 9.96	10.46	-9.42	9.47	-11.26	.0	24.1	11.4	1.2	141
1983	7	4	.0	2445519.5	6 40.727	+12 11.20	6 42.560	+12 9.23	10.43	-11.69	9.44	-11.29	.0	24.1	10.9	1.2	83
1983	7	9	.0	2445524.5	6 42.416	+12 10.06	6 44.250	+12 8.01	10.40	-13.97	9.40	-11.31	.0	24.1	12.1	1.3	19
1983	7	14	.0	2445529.5	6 44.102	+12 8.43	6 45.936	+12 6.32	10.35	-16.24	9.37	-11.34	.0	24.0	14.5	1.6	60
1983	7	19	.0	2445534.5	6 45.772	+12 6.35	6 47.607	+12 4.16	10.30	-18.47	9.34	-11.36	.0	24.0	17.6	1.9	126
1983	7	24	.0	2445539.5	6 47.417	+12 3.81	6 49.253	+12 1.54	10.24	-20.65	9.30	-11.39	.0	24.0	21.2	2.3	165
1983	7	29	.0	2445544.5	6 49.027	+12 .84	6 50.863	+11 58.51	10.18	-22.79	9.27	-11.41	.0	24.0	25.0	2.7	112
1983	8	3	.0	2445549.5	6 50.591	+11 57.45	6 52.428	+11 55.05	10.11	-24.87	9.24	-11.44	.0	24.0	29.0	3.1	51
1983	8	8	.0	2445554.5	6 52.100	+11 53.67	6 53.938	+11 51.21	10.04	-26.90	9.21	-11.47	.0	23.9	33.1	3.5	24
1983	8	13	.0	2445559.5	6 53.541	+11 49.52	6 55.379	+11 46.99	9.96	-28.84	9.17	-11.49	.0	23.9	37.3	3.8	94
1983	8	18	.0	2445564.5	6 54.902	+11 45.02	6 56.741	+11 42.43	9.87	-30.67	9.14	-11.52	.0	23.9	41.6	4.2	155
1983	8	23	.0	2445569.5	6 56.173	+11 40.22	6 58.013	+11 37.57	9.78	-32.39	9.11	-11.55	.0	23.8	45.9	4.6	139
1983	8	28	.0	2445574.5	6 57.344	+11 35.13	6 59.185	+11 32.43	9.69	-34.00	9.07	-11.57	.0	23.8	50.3	4.9	81
1983	9	2	.0	2445579.5	6 58.404	+11 29.79	7 .245	+11 27.04	9.58	-35.49	9.04	-11.60	.0	23.8	54.7	5.2	20
1983	9	7	.0	2445584.5	6 59.340	+11 24.24	7 1.182	+11 21.45	9.48	-36.84	9.01	-11.63	.0	23.8	59.2	5.5	58
1983	9	12	.0	2445589.5	7 .140	+11 18.52	7 1.983	+11 15.69	9.37	-38.03	8.97	-11.65	.0	23.7	63.7	5.8	127
1983	9	17	.0	2445594.5	7 .793	+11 12.67	7 2.637	+11 9.81	9.26	-39.05	8.94	-11.68	.0	23.7	68.3	6.0	162
1983	9	22	.0	2445599.5	7 1.289	+11 6.74	7 3.133	+11 3.87	9.15	-39.89	8.90	-11.71	.0	23.7	73.0	6.2	109
1983	9	27	.0	2445604.5	7 1.616	+11 .79	7 3.462	+10 57.89	9.03	-40.55	8.87	-11.74	.0	23.6	77.7	6.3	48
1983	10	2	.0	2445609.5	7 1.766	+10 54.84	7 3.613	+10 51.94	8.91	-41.03	8.84	-11.77	.0	23.6	82.4	6.4	25
1983	10	7	.0	2445614.5	7 1.725	+10 48.97	7 3.573	+10 46.06	8.79	-41.29	8.80	-11.80	.0	23.5	87.3	6.5	94
1983	10	12	.0	2445619.5	7 1.485	+10 43.22	7 3.334	+10 40.32	8.67	-41.31	8.77	-11.82	.0	23.5	92.2	6.5	157
1983	10	17	.0	2445624.5	7 1.037	+10 37.65	7 2.889	+10 34.77	8.56	-41.11	8.73	-11.85	.0	23.5	97.1	6.5	135
1983	10	22	.0	2445629.5	7 .376	+10 32.33	7 2.229	+10 29.48	8.44	-40.68	8.70	-11.88	.0	23.4	102.1	6.4	76
1983	10	27	.0	2445634.5	6 59.496	+10 27.31	7 1.351	+10 24.49	8.32	-40.02	8.67	-11.91	.0	23.4	107.2	6.3	17
1983	11	1	.0	2445639.5	6 58.392	+10 22.64	7 .249	+10 19.86	8.21	-39.12	8.63	-11.94	.0	23.4	112.3	6.1	62
1983	11	6	.0	2445644.5	6 57.061	+10 18.38	6 58.919	+10 15.66	8.09	-37.96	8.60	-11.97	.0	23.3	117.4	5.9	130
1983	11	11	.0	2445649.5	6 55.504	+10 14.60	6 57.364	+10 11.94	7.99	-36.55	8.56	-12.00	.0	23.3	122.7	5.6	158
1983	11	16	.0	2445654.5	6 53.723	+10 11.34	6 55.586	+10 8.77	7.88	-34.90	8.53	-12.03	.0	23.2	127.9	5.2	103
1983	11	21	.0	2445659.5	6 51.727	+10 8.67	6 53.591	+10 6.18	7.79	-38.04	8.49	-12.06	.0	23.2	133.2	4.9	41
1983	11	26	.0	2445664.5	6 49.524	+10 6.61	6 51.390	+10 4.22	7.69	-30.96	8.46	-12.09	.0	23.2	138.5	4.4	34
1983	12	1	.0	2445669.5	6 47.124	+10 5.21	6 48.992	+10 2.93	7.61	-28.67	8.42	-12.12	.0	23.1	143.8	4.0	102
1983	12	6	.0	2445674.5	6 44.542	+10 4.51	6 46.413	+10 2.34	7.53	-26.18	8.39	-12.15	.0	23.1	149.0	3.5	161
1983	12	11	.0	2445679.5	6 41.799	+10 4.54	6 43.673	+10 2.50	7.46	-23.52	8.35	-12.19	.0	23.1	154.1	3.0	127
1983	12	16	.0	2445684.5	6 3[illegible].919	+10 5.32	6 40.794	+10 3.40	7.39	-20.74	8.32	-12.22	.0	23.0	158.8	2.4	68
1983	12	21	.0	2445689.5	6 35.925	+10 6.84	6 37.803	+10 5.07	7.34	-17.87	8.28	-12.25	.0	23.0	163.0	2.0	[illegible]
1983	12	26	.0	2445694.5	6 32.646	+10 9.12	6 34.726	+10 7.49	7.29	-14.92	8.25	-12.28	.0	23.0	166.0	1.7	[illegible]
1983	12	31	.0	2445699.5	6 29.705	+10 12.15	6 31.591	+10 10.66	7.25	-11.91	8.21	-12.31	.0	23.0	166.9	1.6	141
1984	1	5	.0	2445704.5	6 26.547	+10 15.90	6 28.431	+10 14.56	7.22	-8.90	8.18	-12.35	.0	23.0	165.4	1.7	149
1984	1	10	.0	2445709.5	6 23.393	+10 20.37	6 25.278	+10 19.19	7.20	-5.93	8.14	-12.38	.0	22.9	162.0	2.1	92
1984	1	15	.0	2445714.5	6 20.276	+10 25.52	6 22.166	+10 24.48	7.19	-3.03	8.10	-12.41	.0	22.9	157.6	2.6	31
1984	1	20	.0	2445719.5	6 17.236	+10 31.30	6 19.125	+10 30.40	7.18	-.25	8.07	-12.45	.0	22.9	152.7	3.2	46
1984	1	25	.0	2445724.5	6 14.293	+10 37.66	6 16.193	+10 36.91	7.19	2.40	8.03	-12.48	.0	22.9	147.5	3.8	117
1984	1	30	.0	2445729.5	6 11.477	+10 44.56	6 13.369	+10 43.94	7.20	4.91	8.00	-12.52	.0	22.9	142.2	4.3	165

Table B-1 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1984	2	4	.0	2445734.5	6 8.815	+10 51.95	6 10.708	+10 51.46	7.21	7.22	7.96	-12.55	.0	22.9	136.8	4.9	114
1984	2	9	.0	2445739.5	6 6.331	+10 59.76	6 8.225	+10 59.40	7.24	9.31	7.92	-12.58	.0	22.9	131.4	5.4	56
1984	2	14	.0	2445744.5	6 4.043	+11 7.95	6 5.938	+11 7.69	7.27	11.15	7.89	-12.62	.0	22.9	126.0	5.8	17
1984	2	19	.0	2445749.5	6 1.967	+11 16.43	6 3.863	+11 16.28	7.30	12.76	7.85	-12.65	.0	22.9	120.7	6.2	87
1984	2	24	.0	2445754.5	6 .114	+11 25.16	6 2.010	+11 25.10	7.34	14.13	7.81	-12.69	.0	22.9	115.3	6.6	154
1984	2	29	.0	2445759.5	5 56.493	+11 34.07	6 .391	+11 34.09	7.38	15.25	7.78	-12.73	.0	22.9	110.0	6.9	138
1984	3	5	.0	2445764.5	5 57.113	+11 43.12	5 59.010	+11 43.20	7.43	16.10	7.74	-12.76	.0	22.9	104.8	7.1	80
1984	3	10	.0	2445769.5	5 55.975	+11 52.23	5 57.874	+11 52.37	7.47	16.68	7.70	-12.80	.0	22.9	99.7	7.3	22
1984	3	15	.0	2445774.5	5 55.081	+12 1.35	5 56.980	+12 1.54	7.52	17.00	7.67	-12.83	.0	22.9	94.6	7.4	52
1984	3	20	.0	2445779.5	5 54.427	+12 10.42	5 56.326	+12 10.64	7.57	17.06	7.63	-12.87	.0	22.9	89.5	7.5	125
1984	3	25	.0	2445784.5	5 54.008	+12 19.40	5 55.908	+12 19.64	7.62	16.95	7.59	-12.91	.0	22.9	84.6	7.5	161
1984	3	30	.0	2445769.5	5 53.820	+12 28.24	5 55.720	+12 28.50	7.67	16.58	7.56	-12.95	.0	22.9	79.6	7.5	105
1984	4	4	.0	2445794.5	5 53.856	+12 36.90	5 55.757	+12 37.15	7.72	15.98	7.52	-12.95	.0	22.9	74.8	7.4	47
1984	4	9	.0	2445799.5	5 54.108	+12 45.32	5 56.010	+12 45.56	7.76	15.17	7.48	-13.02	.0	22.9	70.0	7.2	22
1984	4	14	.0	2445804.5	5 54.564	+12 53.46	5 56.467	+12 53.69	7.81	14.17	7.44	-13.06	.0	22.9	65.3	7.0	90
1984	4	19	.0	2445809.5	5 55.215	+13 1.29	5 57.118	+13 1.49	7.84	13.02	7.40	-13.10	.0	22.9	60.7	6.8	158
1984	4	24	.0	2445814.5	5 56.049	+13 8.78	5 57.953	+13 8.94	7.88	11.70	7.37	-13.14	.0	22.9	56.1	6.5	132
1984	4	29	.0	2445819.5	5 57.056	+13 15.90	5 58.961	+13 16.01	7.91	10.23	7.33	-13.18	.0	22.9	51.6	6.2	75
1984	5	4	.0	2445824.5	5 58.225	+13 22.60	6 .131	+13 22.66	7.94	8.61	7.29	-13.22	.0	22.9	47.2	5.8	17
1984	5	9	.0	2445829.5	5 59.544	+13 28.87	6 1.451	+13 28.87	7.96	6.86	7.25	-13.26	.0	22.9	42.8	5.4	56
1984	5	14	.0	2445834.5	6 .998	+13 34.68	6 2.906	+13 34.60	7.98	5.02	7.21	-13.30	.0	22.9	38.4	5.0	126
1984	5	19	.0	2445839.5	6 2.577	+13 40.00	6 4.486	+13 39.85	7.99	3.10	7.18	-13.34	.0	22.9	34.2	4.5	160
1984	5	24	.0	2445844.5	6 4.269	+13 44.83	6 6.179	+13 44.60	8.00	1.09	7.14	-13.39	.0	22.9	30.0	4.1	104
1984	5	29	.0	2445849.5	6 6.063	+13 49.14	6 7.974	+13 48.83	8.00	-1.01	7.10	-13.43	.0	22.9	25.9	3.6	45
1984	6	3	.0	2445854.5	6 7.946	+13 52.92	6 9.858	+13 52.51	7.99	-3.17	7.06	-13.47	.0	22.9	21.9	3.1	24
1984	6	8	.0	2445859.5	6 9.905	+13 56.15	6 11.819	+13 55.65	7.98	-5.37	7.02	-13.51	.0	22.8	18.1	2.6	92
1984	6	13	.0	2445864.5	6 11.928	+13 58.92	6 13.843	+13 58.23	7.96	-7.59	6.98	-13.56	.0	22.8	14.6	2.1	158
1984	6	18	.0	2445869.5	6 14.004	+14 .94	6 15.920	+14 .26	7.93	-9.84	6.94	-13.60	.0	22.8	11.7	1.7	133
1984	6	23	.0	2445874.5	6 16.120	+14 2.50	6 18.037	+14 1.72	7.90	-12.11	6.90	-13.65	.0	22.8	9.7	1.4	75
1984	6	28	.0	2445879.5	6 18.266	+14 3.49	6 20.184	+14 2.60	7.86	-14.39	6.86	-13.69	.0	22.8	9.4	1.4	17
1984	7	3	.0	2445884.5	6 20.428	+14 3.92	6 22.348	+14 2.91	7.82	-16.67	6.82	-13.74	.0	22.7	10.9	1.6	58
1984	7	8	.0	2445889.5	6 22.594	+14 3.77	6 24.514	+14 2.68	7.77	-18.92	6.78	-13.78	.0	22.7	13.6	2.0	126
1984	7	13	.0	2445894.5	6 24.749	+14 3.08	6 26.671	+14 1.86	7.71	-21.13	6.74	-13.83	.0	22.7	16.9	2.5	162
1984	7	18	.0	2445899.5	6 26.884	+14 1.84	6 28.806	+14 .55	7.65	-23.31	6.70	-13.88	.0	22.6	20.6	3.1	105
1984	7	23	.0	2445904.5	6 28.984	+14 .06	6 30.907	+13 58.67	7.58	-25.45	6.66	-13.92	.0	22.6	24.4	3.6	47
1984	7	28	.0	2445909.5	6 31.038	+13 57.76	6 32.962	+13 58.27	7.50	-27.55	6.62	-13.97	.0	22.6	28.4	4.2	23
1984	8	2	.0	2445914.5	6 33.030	+13 54.95	6 34.955	+13 53.37	7.42	-29.57	6.58	-14.02	.0	22.5	32.5	4.8	93
1984	8	7	.0	2445919.5	6 34.944	+13 51.65	6 36.870	+13 49.98	7.33	-31.50	6.54	-14.07	.0	22.5	36.6	5.3	158

Table B-2. Ephemeris (with Perturbations) for Comet Halley at One-Day Intervals from August 8, 1984, to May 4, 1987.

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1984	8	8	.0	2445920.5	6 35.317	+13 50.94	6 37.243	+13 49.25	7.31	-31.87	6.53	-14.08	.0	22.5	37.5	5.4	166
1984	8	9	.0	2445921.5	6 35.685	+13 50.20	6 37.612	+13 48.50	7.29	-32.24	6.53	-14.09	.0	22.5	38.3	5.5	165
1984	8	10	.0	2445922.5	6 36.050	+13 49.45	6 37.977	+13 47.73	7.27	-32.61	6.52	-14.10	.0	22.5	39.2	5.6	156
1984	8	11	.0	2445923.5	6 36.411	+13 48.68	6 38.338	+13 46.95	7.25	-32.98	6.51	-14.11	.0	22.5	40.0	5.7	145
1984	8	12	.0	2445924.5	6 36.768	+13 47.90	6 38.695	+13 46.14	7.23	-33.34	6.50	-14.12	.0	22.5	40.8	5.8	134
1984	8	13	.0	2445925.5	6 37.121	+13 47.09	6 39.048	+13 45.32	7.22	-33.69	6.49	-14.13	.0	22.5	41.7	6.0	123
1984	8	14	.0	2445926.5	6 37.469	+13 46.27	6 39.396	+13 44.49	7.20	-34.05	6.49	-14.14	.0	22.4	42.5	6.1	111
1984	8	15	.0	2445927.5	6 37.813	+13 45.43	6 39.740	+13 43.63	7.18	-34.40	6.48	-14.15	.0	22.4	43.4	6.2	100
1984	8	16	.0	2445928.5	6 38.152	+13 44.58	6 40.079	+13 42.76	7.16	-34.74	6.47	-14.16	.0	22.4	44.2	6.3	88
1984	8	17	.0	2445929.5	6 38.487	+13 43.71	6 40.414	+13 41.87	7.14	-35.09	6.46	-14.17	.0	22.4	45.1	6.4	77
1984	8	18	.0	2445930.5	6 38.816	+13 42.82	6 40.744	+13 40.97	7.12	-35.42	6.45	-14.18	.0	22.4	46.0	6.5	65
1984	8	19	.0	2445931.5	6 39.141	+13 41.92	6 41.069	+13 40.05	7.10	-35.76	6.44	-14.19	.0	22.4	46.8	6.6	53
1984	8	20	.0	2445932.5	6 39.461	+13 41.00	6 41.389	+13 39.12	7.07	-36.09	6.44	-14.20	.0	22.4	47.7	6.7	42
1984	8	21	.0	2445933.5	6 39.776	+13 40.06	6 41.703	+13 38.16	7.05	-36.41	6.43	-14.21	.0	22.4	48.5	6.8	30
1984	8	22	.0	2445934.5	6 40.085	+13 39.11	6 42.013	+13 37.20	7.03	-36.74	6.42	-14.22	.0	22.4	49.4	6.9	19
1984	8	23	.0	2445935.5	6 40.389	+13 38.15	6 42.317	+13 36.22	7.01	-37.05	6.41	-14.23	[illegible]	22.4	50.3	7.0	12
1984	8	24	.0	2445936.5	6 40.687	+13 37.17	6 42.615	+13 35.22	6.99	-37.37	6.40	-14.24	.0	22.4	51.1	7.1	17
1984	8	25	.0	2445937.5	6 40.979	+13 36.17	6 42.908	+13 34.22	6.97	-37.67	6.40	-14.25	.0	22.3	52.0	7.2	29
1984	8	26	.0	2445938.5	6 41.265	+13 35.16	6 43.194	+13 33.19	6.95	-37.97	6.39	-14.26	.0	22.3	52.9	7.2	42
1984	8	27	.0	2445939.5	6 41.546	+13 34.14	6 43.475	+13 32.16	6.92	-38.27	6.38	-14.27	.0	22.3	53.8	7.3	57
1984	8	28	.0	2445940.5	6 41.820	+13 33.10	6 43.749	+13 31.11	6.90	-38.56	6.37	-14.28	.0	22.3	54.7	7.4	71
1984	8	29	.0	2445941.5	6 42.087	+13 32.05	6 44.017	+13 30.05	6.88	-38.84	6.36	-14.29	.0	22.3	55.5	7.5	86
1984	8	30	.0	2445942.5	6 42.348	+13 30.99	6 44.278	+13 28.97	6.86	-39.12	6.35	-14.30	.0	22.3	56.4	7.6	100
1984	8	31	.0	2445943.5	6 42.603	+13 29.91	6 44.532	+13 27.88	6.83	-39.39	6.35	-14.31	.0	22.3	57.3	7.7	114
1984	9	1	.0	2445944.5	6 42.850	+13 28.82	6 44.780	+13 26.78	6.81	-39.66	6.34	-14.32	.0	22.3	58.2	7.8	128
1984	9	2	.0	2445945.5	6 43.091	+13 27.72	6 45.021	+13 25.67	6.79	-39.92	6.33	-14.33	.0	22.3	59.1	7.9	141
1984	9	3	.0	2445946.5	6 43.325	+13 26.61	6 45.255	+13 24.55	6.77	-40.17	6.32	-14.[illegible]	.0	22.3	60.0	7.9	153
1984	9	4	.0	2445947.5	6 43.551	+13 25.49	6 45.481	+13 23.41	6.74	-40.42	6.31	-14.35	.0	22.2	60.9	8.0	163
1984	9	5	.0	2445948.5	6 43.770	+13 24.36	6 45.701	+13 22.27	6.72	-40.66	6.30	-14.36	.0	22.2	61.8	8.1	166
1984	9	6	.0	2445949.5	6 43.982	+13 23.21	6 45.912	+13 21.11	6.70	-40.89	6.30	-14.37	.0	22.2	62.7	8.2	160
1984	9	7	.0	2445950.5	6 44.186	+13 22.06	6 46.116	+13 19.95	6.67	-41.12	6.29	-14.38	.0	22.2	63.6	8.3	150
1984	9	8	.0	2445951.5	6 44.382	+13 20.90	6 46.313	+13 18.78	6.65	-41.34	6.28	-14.40	.0	22.2	64.5	8.3	139
1984	9	9	.0	2445952.5	6 44.570	+13 19.72	6 46.501	+13 17.60	6.62	-41.56	6.27	-14.41	.0	22.2	65.4	8.4	127
1984	9	10	.0	2445953.5	6 44.750	+13 18.54	6 46.681	+13 16.41	6.60	-41.77	6.26	-14.42	.0	22.2	66.3	8.5	116
1984	9	11	.0	2445954.5	6 44.922	+13 17.35	6 46.854	+13 15.21	6.58	-41.97	6.25	-14.43	.0	22.2	67.2	8.5	104
1984	9	12	.0	2445955.5	6 45.086	+13 16.15	6 47.017	+13 14.01	6.55	-42.17	6.25	-14.44	.0	22.2	68.1	8.6	93
1984	9	13	.0	2445956.5	6 45.241	+13 14.95	6 47.172	+13 12.79	6.53	-42.36	6.24	-14.45	.0	22.1	69.1	8.7	81
1984	9	14	.0	2445957.5	6 45.387	+13 13.73	6 47.319	+13 11.57	6.50	-42.55	6.23	-14.46	.0	22.1	70.0	8.7	70
1984	9	15	.0	2445958.5	6 45.525	+13 12.51	6 47.457	+13 10.34	6.48	-42.73	6.22	-14.47	.0	22.1	70.9	8.8	58
1984	9	16	.0	2445959.5	6 45.654	+13 11.29	6 47.586	+13 9.11	6.45	-42.90	6.21	-14.48	.0	22.1	71.8	8.8	47
1984	9	17	.0	2445960.5	6 45.774	+13 10.05	6 47.706	+13 7.87	6.43	-43.06	6.20	-14.49	.0	22.1	72.8	8.9	35
1984	9	18	.0	2445961.5	6 45.884	+13 8.81	6 47.816	+13 6.62	6.40	-43.22	6.20	-14.50	.0	22.1	73.7	9.0	24
1984	9	19	.0	2445962.5	6 45.985	+13 7.57	6 47.917	+13 5.37	6.38	-43.37	6.19	-14.51	.0	22.1	74.6	9.0	15
1984	9	20	.0	2445963.5	6 46.076	+13 6.32	6 48.009	+13 4.12	6.35	-43.52	6.18	-14.52	.0	22.1	75.6	9.1	14
1984	9	21	.0	2445964.5	6 46.157	+13 5.06	6 48.091	+13 2.86	6.33	-43.65	6.17	-14.53	.0	22.1	76.5	9.1	23
1984	9	22	.0	2445965.5	6 46.229	+13 3.80	6 48.162	+13 1.60	6.30	-43.78	6.16	-14.55	.0	22.0	77.5	9.1	35
1984	9	23	.0	2445966.5	6 46.290	+13 2.54	6 48.224	+13 .33	6.28	-43.90	6.15	-14.56	.0	22.0	78.4	9.2	49
1984	9	24	.0	2445967.5	6 46.341	+13 1.27	6 48.275	+12 59.06	6.25	-44.01	6.15	-14.57	.0	22.0	79.4	9.2	63
1984	9	25	.0	2445968.5	6 46.381	+13 .00	6 48.315	+12 57.79	6.23	-44.11	6.14	-14.58	.0	22.0	80.3	9.3	78
1984	9	26	.0	2445969.5	6 46.411	+12 58.73	6 48.3[illegible]	+12 56.52	6.20	-44.21	6.13	-14.59	.0	22.0	81.3	9.3	93
1984	9	27	.0	2445970.5	6 46.430	+12 57.46	6 48.364	+12 55.24	6.18	-44.29	6.12	-14.60	.0	22.0	82.2	9.3	108
1984	9	28	.0	2445971.5	6 46.438	+12 56.18	6 48.372	+12 53.97	6.15	-44.37	6.11	-14.61	.0	22.0	83.2	9.4	122
1984	9	29	.0	2445972.5	6 46.435	+12 54.91	6 48.369	+12 52.69	6.12	-44.43	6.10	-14.62	.0	22.0	84.2	9.4	136
1984	9	30	.0	2445973.5	6 46.420	+12 53.63	6 48.3[illegible]5	+12 51.41	6.10	-44.49	6.10	-14.63	.0	22.0	85.1	9.4	149
1984	10	1	.0	2445974.5	6 46.394	+12 52.35	6 48.3[illegible]9	+12 50.14	6.07	-44.54	6.09	-14.65	.0	21.9	86.1	9.4	160

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1984	10	2	.0	2445975.5	6 46.356	+12 51.08	6 48.292	+12 48.86	6.05	-44.58	6.08	-14.66	.0	21.9	87.1	9.5	166
1984	10	3	.0	2445976.5	6 46.307	+12 49.81	6 48.243	+12 47.59	6.02	-44.61	6.07	-14.67	.0	21.9	88.0	9.5	162
1984	10	4	.0	2445977.5	6 46.245	+12 48.54	6 48.182	+12 46.33	6.00	-44.63	6.06	-14.68	.0	21.9	89.0	9.5	152
1984	10	5	.0	2445978.5	6 46.172	+12 47.27	6 48.109	+12 45.06	5.97	-44.65	6.05	-14.69	.0	21.9	90.0	9.5	142
1984	10	6	.0	2445979.5	6 46.087	+12 46.00	6 48.023	+12 43.80	5.94	-44.65	6.04	-14.70	.0	21.9	91.0	9.5	130
1984	10	7	.0	2445980.5	6 45.989	+12 44.74	6 47.926	+12 42.54	5.92	-44.65	6.04	-14.71	.0	21.9	92.0	9.5	119
1984	10	8	.0	2445981.5	6 45.878	+12 43.48	6 47.815	+12 41.29	5.89	-44.63	6.03	-14.72	.0	21.9	93.0	9.5	107
1984	10	9	.0	2445982.5	6 45.756	+12 42.22	6 47.692	+12 40.04	5.87	-44.61	6.02	-14.74	.0	21.8	94.0	9.5	96
1984	10	10	.0	2445983.5	6 45.619	+12 40.98	6 47.557	+12 38.79	5.84	-44.58	6.01	-14.75	.0	21.8	95.0	9.5	84
1984	10	11	.0	2445984.5	6 45.470	+12 39.73	6 47.408	+12 37.56	5.82	-44.54	6.00	-14.76	.0	21.8	96.0	9.5	73
1984	10	12	.0	2445985.5	6 45.309	+12 38.49	6 47.246	+12 36.32	5.79	-44.49	5.99	-14.77	.0	21.8	97.0	9.5	61
1984	10	13	.0	2445986.5	6 45.133	+12 37.26	6 47.071	+12 35.10	5.76	-44.43	5.99	-14.78	.0	21.8	98.0	9.5	50
1984	10	14	.0	2445987.5	6 44.945	+12 36.03	6 46.883	+12 33.88	5.74	-44.36	5.98	-14.79	.0	21.8	99.0	9.5	38
1984	10	15	.0	2445988.5	6 44.743	+12 34.82	6 46.680	+12 32.67	5.71	-44.29	5.97	-14.80	.0	21.8	100.1	9.5	27
1984	10	16	.0	2445989.5	6 44.527	+12 33.61	6 46.466	+12 31.47	5.69	-44.20	5.96	-14.82	.0	21.8	101.1	9.4	17
1984	10	17	.0	2445990.5	6 44.297	+12 32.40	6 46.236	+12 30.28	5.66	-44.1[illegible]	5.95	-14.83	.0	21.7	102.1	9.4	14
1984	10	18	.0	2445991.5	6 44.053	+12 31.21	6 45.993	+12 29.10	5.64	-43.99	5.94	-14.84	.0	21.7	103.1	9.4	20
1984	10	19	.0	2445992.5	6 43.795	+12 30.03	6 45.735	+12 27.93	5.61	-43.87	5.93	-14.85	.0	21.7	104.2	9.4	31
1984	10	20	.0	2445993.5	6 43.523	+12 28.85	6 45.463	+12 26.77	5.59	-43.75	5.93	-14.86	.0	21.7	105.2	9.3	44
1984	10	21	.0	2445994.5	6 43.236	+12 27.69	6 45.177	+12 25.62	5.56	-43.61	5.92	-14.87	.0	21.7	106.3	9.3	58
1984	10	22	.0	2445995.5	6 42.934	+12 26.54	6 44.875	+12 24.48	5.53	-43.46	5.91	-14.89	.0	21.7	107.3	9.3	73
1984	10	23	.0	2445996.5	6 42.618	+12 25.40	6 44.559	+12 23.35	5.51	-43.29	5.90	-14.90	.0	21.7	108.4	9.2	87
1984	10	24	.0	2445997.5	6 42.287	+12 24.27	6 44.228	+12 22.24	5.48	-43.12	5.89	-14.91	.0	21.6	109.4	9.2	102
1984	10	25	.0	244599[illegible]	6 41.941	+12 23.15	6 43.883	+12 21.14	5.46	-[illegible]2.94	5.88	-14.92	.0	21.6	110.5	9.1	117
1984	10	26	.0	24459[illegible]	6 41.579	+12 22.05	6 43.522	+12 20.05	5.44	-42.74	5.87	-14.93	.0	21.6	111.5	9.1	131
1984	10	27	.0	2446000.5	6 41.203	+12 20.96	6 43.146	+12 18.98	5.41	-42.53	5.86	-14.95	.0	21.6	112.6	9.0	144
1984	10	28	.0	2446001.5	6 40.811	+12 19.89	6 42.754	+12 17.93	5.39	-42.31	5.86	-14.96	.0	21.6	113.7	8.9	156
1984	10	29	.0	2446002.5	6 40.404	+12 18.83	6 42.348	+12 16.89	5.36	-42.08	5.85	-14.97	.0	21.6	114.8	8.9	164
1984	10	30	.0	2446003.5	6 39.982	+12 17.79	6 41.926	+12 15.87	5.34	-41.84	5.84	-14.98	.0	21.6	115.8	8.8	163
1984	10	31	.0	2446004.5	6 39.544	+12 16.77	6 41.488	+12 14.86	5.31	-41.59	5.83	-14.99	.0	21.6	116.9	8.7	154
1984	11	1	.0	2446005.5	6 39.090	+12 15.76	6 41.035	+12 13.88	5.29	-41.33	5.82	-15.01	.0	21.5	118.0	8.7	143
1984	11	2	.0	2446006.5	6 38.621	+12 14.77	6 40.566	+12 12.91	5.27	-41.06	5.81	-15.02	.0	21.5	119.1	8.6	131
1984	11	3	.0	2446007.5	6 38.136	+12 13.79	6 40.082	+12 11.96	5.24	-40.77	5.80	-15.03	.0	21.5	120.2	8.5	120
1984	11	4	.0	2446008.5	6 37.636	+12 12.84	6 39.582	+12 11.03	5.22	-40.48	5.80	-15.04	.0	21.5	121.3	8.4	108
1984	11	5	.0	2446009.5	6 37.120	+12 11.91	6 39.066	+12 10.12	5.20	-40.17	5.79	-15.05	.0	21.5	122.4	8.3	97
1984	11	6	.0	2446010.5	6 36.588	+12 10.99	6 38.534	+12 9.23	5.17	-39.86	5.78	-15.07	.0	21.5	123.5	8.2	85
1984	11	7	.0	2446011.5	6 36.040	+12 10.09	6 37.987	+12 8.36	5.15	-39.53	5.77	-15.08	.0	21.5	124.6	8.1	74
1984	11	8	.0	2446012.5	6 35.477	+12 9.22	6 37.424	+12 7.51	5.13	-39.20	5.76	-15.09	.0	21.5	125.7	8.0	62
1984	11	9	.0	2446013.5	6 34.897	+12 8.36	6 36.845	+12 6.68	5.10	-38.85	5.75	-15.10	.0	21.4	126.8	7.9	50
1984	11	10	.0	24460[illegible].5	6 34.302	+12 7.53	6 36.250	+12 5.88	5.08	-38.49	5.74	-15.12	.0	21.4	127.9	7.8	39
1984	11	11	.0	2446015.5	6 33.691	+12 6.72	6 35.639	+12 5.09	5.06	-38.13	5.73	-15.13	.0	21.4	129.0	7.7	27
1984	11	12	.0	2446016.5	6 33.064	+12 5.93	6 35.013	+12 4.33	5.04	-37.75	5.73	-15.14	.0	21.4	130.1	7.6	18
1984	11	13	.0	2446017.5	6 32.421	+12 5.16	6 34.370	+12 3.60	5.02	-37.36	5.72	-15.15	.0	21.4	131.3	7.5	14
1984	11	14	.0	2446018.5	6 31.762	+12 4.42	6 33.712	+12 2.88	4.99	-36.96	5.71	-15.17	.0	21.4	132.4	7.4	20
1984	11	15	.0	2446019.5	6 31.088	+12 3.69	6 33.038	+12 2.20	4.97	-36.55	5.70	-15.18	.0	21.4	133.5	7.2	31
1984	11	16	.0	2446020.5	6 30.394	+12 3.00	6 32.349	+12 1.53	4.95	-36.13	5.69	-15.19	.0	21.3	134.6	7.1	44
1984	11	17	.0	2446021.5	6 29.692	+12 2.32	6 31.643	+12 .89	4.93	-35.69	5.68	-15.20	.0	21.3	135.8	7.0	57
1984	11	18	.0	2446022.5	6 28.970	+12 1.68	6 30.922	+12 .28	4.91	-35.25	5.67	-15.22	.0	21.3	136.9	6.8	71
1984	11	19	.0	2446023.5	6 28.233	+12 1.05	6 30.185	+11 59.69	4.89	-34.80	5.66	-15.23	.0	21.3	138.1	6.7	85
1984	11	20	.0	2446024.5	6 27.481	+12 .46	6 29.433	+11 59.13	4.87	-34.33	5.66	-15.24	.0	21.3	139.2	6.6	100
1984	11	21	.0	2446025.5	6 26.713	+11 59.88	6 28.666	+11 58.60	4.85	-33.85	5.65	-15.25	.0	21.3	140.3	6.4	114
1984	11	22	.0	2446026.5	6 25.930	+11 59.34	6 27.883	+11 58.09	4.83	-33.37	5.64	-15.27	.0	21.3	141.5	6.3	128
1984	11	23	.0	2446027.5	6 25.132	+11 58.82	6 27.085	+11 57.61	4.81	-32.87	5.63	-15.28	.0	21.3	142.6	6.1	142
1984	11	24	.0	2446028.5	6 24.319	+11 58.33	6 26.273	+11 57.16	4.79	-32.36	5.62	-15.29	.0	21.3	143.8	6.0	155
1984	11	25	.0	2446029.5	6 23.492	+11 57.87	6 25.446	+11 56.74	4.78	-31.84	5.61	-15.31	.0	21.2	144.9	5.8	164
1984	11	26	.0	2446030.5	6 22.650	+11 57.44	6 24.60[illegible]	+11 56.35	4.76	-31.32	5.60	-15.32	.0	21.2	146.0	5.6	163

Table B-2 (contd)

YR	MN	DY	HR	J.D.[a]	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1984	11	27	.0	2446031.5	6 21.794	+11 57.03	6 23.749	+11 55.98	4.74	-30.78	5.59	-15.33	.0	21.2	147.2	5.5	154
1984	11	28	.0	2446032.5	6 20.927	+11 56.66	6 22.879	+11 55.65	4.72	-30.24	5.59	-15.34	.0	21.2	148.3	5.3	142
1984	11	29	.0	2446033.5	6 20.039	+11 56.31	6 21.996	+11 55.35	4.70	-29.69	5.58	-15.36	.0	21.2	149.5	5.2	131
1984	11	30	.0	2446034.5	6 19.142	+11 55.99	6 21.099	+11 55.08	4.69	-29.12	5.57	-15.37	.0	21.2	150.6	5.0	119
1984	12	1	.0	2446035.5	6 18.231	+11 55.70	6 20.188	+11 54.83	4.67	-28.56	5.56	-15.38	.0	21.2	151.7	4.8	107
1984	12	2	.0	2446036.5	6 17.308	+11 55.45	6 19.265	+11 54.62	4.65	-27.98	5.55	-15.40	.0	21.2	152.8	4.7	96
1984	12	3	.0	2446037.5	6 16.371	+11 55.22	6 18.329	+11 54.44	4.64	-27.40	5.54	-15.41	.0	21.1	153.9	4.5	84
1984	12	4	.0	2446038.5	6 15.423	+11 55.02	6 17.381	+11 54.29	4.62	-26.81	5.53	-15.42	.0	21.1	155.1	4.3	72
1984	12	5	.0	2446039.5	6 14.462	+11 54.86	6 16.420	+11 54.17	4.61	-26.21	5.52	-15.44	.0	21.1	156.1	4.1	60
1984	12	6	.0	2446040.5	6 13.490	+11 54.72	6 15.448	+11 54.08	4.59	-25.61	5.51	-15.45	.0	21.1	157.2	4.0	49
1984	12	7	.0	2446041.5	6 12.506	+11 54.61	6 14.465	+11 54.02	4.58	-25.00	5.50	-15.46	17.0	21.1	158.3	3.8	37
1984	12	8	.0	2446042.5	6 11.511	+11 54.54	6 13.470	+11 54.00	4.56	-24.38	5.50	-15.48	17.0	21.1	159.3	3.6	26
1984	12	9	.0	2446043.5	6 10.505	+11 54.50	6 12.465	+11 54.00	4.55	-23.76	5.49	-15.49	17.0	21.1	160.4	3.5	17
1984	12	10	.0	2446044.5	6 9.490	+11 54.48	6 11.450	+11 54.04	4.54	-23.13	5.48	-15.50	17.0	21.1	161.4	3.3	16
1984	12	11	.0	2446045.5	6 8.464	+11 54.50	6 10.425	+11 54.11	4.52	-22.50	5.47	-15.52	16.9	21.1	162.4	3.1	22
1984	12	12	.0	2446046.5	6 7.428	+11 54.55	6 9.390	+11 54.21	4.51	-21.86	5.46	-15.53	16.9	21.1	163.3	3.0	34
1984	12	13	.0	2446047.5	6 6.384	+11 54.63	6 8.345	+11 54.35	4.50	-21.22	5.45	-15.54	16.9	21.0	164.2	2.8	47
1984	12	14	.0	2446048.5	6 5.330	+11 54.75	6 7.292	+11 54.51	4.49	-20.57	5.44	-15.56	16.9	21.0	165.0	2.7	60
1984	12	15	.0	2446049.5	6 4.269	+11 54.89	6 6.231	+11 54.71	4.47	-19.91	5.43	-15.57	16.9	21.0	165.8	2.5	74
1984	12	16	.0	2446050.5	6 3.199	+11 55.07	6 5.162	+11 54.94	4.46	-19.26	5.42	-15.59	16.9	21.0	166.5	2.4	88
1984	12	17	.0	2446051.5	6 2.122	+11 55.28	6 4.085	+11 55.21	4.45	-18.60	5.42	-15.60	16.9	21.0	167.1	2.3	102
1984	12	18	.0	2446052.5	6 1.039	+11 55.52	6 3.002	+11 55.50	4.44	-17.93	5.41	-15.61	16.8	21.0	167.7	2.2	116
1984	12	19	.0	2446053.5	5 59.948	+11 55.80	6 1.912	+11 55.83	4.43	-17.26	5.40	-15.63	16.8	21.0	168.1	2.2	130
1984	12	20	.0	2446054.5	58.852	+11 56.10	6 .816	+11 56.19	4.42	-16.59	5.39	-15.64	16.8	21.0	168.3	2.1	143
1984	12	21	.0	2446055.5	5 57.751	+11 56.44	5 59.715	+11 56.59	4.41	-15.92	5.38	-15.65	16.8	21.0	168.5	2.1	156
1984	12	22	.0	2446056.5	5 56.644	+11 56.82	5 58.608	+11 57.01	4.40	-15.25	5.37	-15.67	16.8	21.0	168.5	2.1	164
1984	12	23	.0	2446057.5	5 55.533	+11 57.22	5 57.498	+11 57.47	4.39	-14.57	5.36	-15.68	16.8	21.0	168.3	2.1	160
1984	12	24	.0	2446058.5	5 54.419	+11 57.66	5 56.384	+11 57.97	4.39	-13.89	5.35	-15.70	16.8	21.0	168.1	2.2	153
1984	12	25	.0	2446059.5	5 53.301	+11 58.13	5 55.266	+11 58.50	4.38	-13.22	5.34	-15.71	16.8	20.9	167.7	2.3	141
1984	12	26	.0	2446060.5	5 52.180	+11 58.64	5 54.146	+11 59.06	4.37	-12.54	5.33	-15.72	16.7	20.9	167.1	2.4	129
1984	12	27	.0	2446061.5	5 51.058	+11 59.17	5 53.024	+11 59.65	4.36	-11.87	5.32	-15.74	16.7	20.9	166.5	2.5	117
1984	12	28	.0	2446062.5	5 49.934	+11 59.74	5 51.900	+12 .28	4.36	-11.20	5.32	-15.75	16.7	20.9	165.8	2.6	104
1984	12	29	.0	2446063.5	5 48.809	+12 .34	5 50.775	+12 .94	4.35	-10.53	5.31	-15.77	16.7	20.9	165.0	2.7	93
1984	12	30	.0	2446064.5	5 47.683	+12 .98	5 49.650	+12 1.63	4.34	-9.86	5.30	-15.78	16.7	20.9	164.2	2.9	81
1984	12	31	.0	2446065.5	5 46.558	+12 1.65	5 48.524	+12 2.35	4.34	-9.20	5.29	-15.80	16.7	20.9	163.3	3.1	69
1985	1	1	.0	2446066.5	5 45.433	+12 2.35	5 47.400	+12 3.11	4.33	-8.54	5.28	-15.81	16.7	20.9	162.3	3.2	57
1985	1	2	.0	2446067.5	5 44.310	+12 3.08	5 46.276	+12 3.89	4.33	-7.88	5.27	-15.82	16.7	20.9	161.3	3.4	46
1985	1	3	.0	2446068.5	5 43.188	+12 3.84	5 45.155	+12 4.71	4.32	-7.23	5.26	-15.84	16.7	20.9	160.3	3.6	34
1985	1	4	.0	2446069.5	5 42.068	+12 4.64	5 44.036	+12 5.57	4.32	-6.59	5.25	-15.85	16.6	20.9	159.2	3.8	23
1985	1	5	.0	2446070.5	5 40.952	+12 5.47	5 42.919	+12 6.45	4.32	-5.94	5.24	-15.87	16.6	20.9	158.1	4.0	15
1985	1	6	.0	2446071.5	5 39.838	+12 6.33	5 41.806	+12 7.37	4.31	-5.30	5.23	-15.88	16.6	20.9	157.0	4.2	15
1985	1	7	.0	2446072.5	5 38.729	+12 7.22	5 40.697	+12 8.31	4.31	-4.67	5.22	-15.90	16.6	20.9	155.9	4.4	24
1985	1	8	.0	2446073.5	5 37.624	+12 8.15	5 39.592	+12 9.29	4.31	-4.05	5.22	-15.91	16.6	20.9	154.8	4.6	37
1985	1	9	.0	2446074.5	5 36.524	+12 9.10	5 38.492	+12 10.30	4.31	-3.42	5.21	-15.93	16.6	20.9	153.6	4.8	50
1985	1	10	.0	2446075.5	5 35.429	+12 10.09	5 37.398	+12 11.35	4.30	-2.81	5.20	-15.94	16.6	20.8	152.5	5.0	64
1985	1	11	.0	2446076.5	5 34.340	+12 11.10	5 36.309	+12 12.42	4.30	-2.20	5.19	-15.96	16.6	20.8	151.3	5.2	78
1985	1	12	.0	2446077.5	5 33.258	+12 12.15	5 35.227	+12 13.52	4.30	-1.60	5.18	-15.97	16.6	20.8	150.1	5.4	92
1985	1	13	.0	2446078.5	5 32.182	+12 13.23	5 34.151	+12 14.66	4.30	-1.00	5.17	-15.98	16.6	20.8	149.0	5.6	106
1985	1	14	.0	2446079.5	5 31.114	+12 14.34	5 33.083	+12 15.82	4.30	-.41	5.16	-16.00	16.5	20.8	147.8	5.8	120
1985	1	15	.0	2446080.5	5 30.054	+12 15.49	5 32.023	+12 17.01	4.30	.17	5.15	-16.01	16.5	20.8	146.6	6.0	133
1985	1	16	.0	2446081.5	5 29.002	+12 16.66	5 30.971	+12 18.24	4.30	.74	5.14	-16.03	16.5	20.8	145.4	6.2	147
1985	1	17	.0	2446082.5	5 27.959	+12 17.86	5 29.928	+12 19.49	4.30	1.30	5.13	-16.04	16.5	20.8	144.2	6.4	159
1985	1	18	.0	2446083.5	5 26.925	+12 19.10	5 28.895	+12 20.78	4.30	1.86	5.12	-16.06	16.5	20.8	143.0	6.6	166
1985	1	19	.0	2446084.5	5 25.902	+12 20.36	5 27.871	+12 22.10	4.30	2.40	5.11	-16.07	16.5	20.8	141.8	6.8	162
1985	1	20	.0	2446085.5	5 24.888	+12 21.66	5 26.858	+12 23.44	4.31	2.94	5.10	-16.09	16.5	20.8	140.6	7.0	151
1985	1	21	.0	2446086.5	5 23.865	+12 22.98	5 25.855	+12 24.82	4.31	3.47	5.09	-16.11	16.5	20.8	139.4	7.2	139

Table B-2 (contd)

YR	MN	DY	HR	I.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	1	22	.0	2446087.5	5 22.893	+12 24.34	5 24.863	+12 26.22	4.31	3.98	5.09	-16.12	16.5	20.8	138.2	7.4	127
1985	1	23	.0	2446088.5	5 21.913	+12 25.73	5 23.883	+12 27.66	4.31	4.48	5.08	-16.14	16.5	20.8	137.0	7.6	114
1985	1	24	.0	2446089.5	5 20.945	+12 27.14	5 22.915	+12 29.12	4.31	4.98	5.07	-16.15	16.5	20.8	135.8	7.8	102
1985	1	25	.0	2446090.5	5 19.989	+12 28.59	5 21.959	+12 30.62	4.32	5.46	5.06	-16.17	16.5	20.8	134.6	8.0	90
1985	1	26	.0	2446091.5	5 19.045	+12 30.06	5 21.015	+12 32.14	4.32	5.93	5.05	-16.18	16.5	20.8	133.4	8.1	78
1985	1	27	.0	2446092.5	5 18.115	+12 31.56	5 20.085	+12 33.69	4.32	6.38	5.04	-16.20	16.4	20.8	132.2	8.3	66
1985	1	28	.0	2446093.5	5 17.198	+12 33.09	5 19.168	+12 35.26	4.33	6.83	5.03	-16.21	16.4	20.8	131.0	8.5	54
1985	1	29	.0	2446094.5	5 16.294	+12 34.65	5 18.264	+12 36.87	4.33	7.26	5.02	-16.23	16.4	20.8	129.8	8.7	43
1985	1	30	.0	2446095.5	5 15.405	+12 36.24	5 17.375	+12 38.50	4.34	7.68	5.01	-16.24	16.4	20.8	128.6	8.8	31
1985	1	31	.0	2446096.5	5 14.529	+12 37.86	5 16.499	+12 40.16	4.34	8.09	5.00	-16.26	16.4	20.8	127.4	9.0	21
1985	2	1	.0	2446097.5	5 13.668	+12 39.50	5 15.638	+12 41.84	4.35	8.49	4.99	-16.28	16.4	20.8	126.2	9.2	13
1985	2	2	.0	2446098.5	5 12.822	+12 41.17	5 14.792	+12 43.56	4.35	8.87	4.98	-16.29	16.4	20.8	125.0	9.3	14
1985	2	3	.0	2446099.5	5 11.990	+12 42.87	5 13.960	+12 45.29	4.36	9.24	4.97	-16.31	16.4	20.8	123.9	9.5	24
1985	2	4	.0	2446100.5	5 11.174	+12 44.59	5 13.144	+12 47.06	4.36	9.60	4.96	-16.32	16.4	20.8	122.7	9.6	37
1985	2	5	.0	2446101.5	5 10.372	+12 46.34	5 12.343	+12 48.85	4.37	9.95	4.95	-16.34	16.4	20.8	121.5	9.8	50
1985	2	6	.0	2446102.5	5 9.586	+12 48.11	5 11.557	+12 50.66	4.37	10.28	4.94	-16.36	16.4	20.8	120.3	9.9	65
1985	2	7	.0	2446103.5	5 8.816	+12 49.91	5 10.787	+12 52.50	4.38	10.61	4.94	-16.37	16.4	20.8	119.2	10.1	79
1985	2	8	.0	2446104.5	5 8.061	+12 51.74	5 10.032	+12 54.36	4.39	10.92	4.93	-16.39	16.4	20.8	118.0	10.2	93
1985	2	9	.0	2446105.5	5 7.323	+12 53.59	5 9.293	+12 56.25	4.39	11.22	4.92	-16.40	16.4	20.8	116.8	10.3	108
1985	2	10	.0	2446106.5	5 6.600	+12 55.47	5 8.571	+12 58.16	4.40	11.51	4.91	-16.42	16.4	20.8	115.7	10.4	122
1985	2	11	.0	2446107.5	5 5.894	+12 57.36	5 7.864	+13 .09	4.41	11.78	4.90	-16.44	16.3	20.8	114.5	10.6	136
1985	2	12	.0	2446108.5	5 5.204	+12 59.29	5 7.174	+13 2.05	4.41	12.04	4.89	-16.45	16.3	20.8	113.4	10.7	150
1985	2	13	.0	2446109.5	5 4.530	+13 1.24	5 6.501	+13 4.03	4.42	12.29	4.88	-16.47	16.3	20.8	112.2	10.8	162
1985	2	14	.0	2446110.5	5 3.873	+13 3.21	5 5.844	+13 6.03	4.43	12.53	4.87	-16.49	16.3	20.8	111.1	10.9	166
1985	2	15	.0	2446111.5	5 3.233	+13 5.20	5 5.203	+13 8.06	4.43	12.76	4.86	-16.50	16.3	20.8	109.9	11.0	162
1985	2	16	.0	2446112.5	5 2.609	+13 7.22	5 4.580	+13 10.11	4.44	12.97	4.85	-16.52	16.3	20.8	108.8	11.1	150
1985	2	17	.0	2446113.5	5 2.002	+13 9.26	5 3.973	+13 12.18	4.45	13.17	4.84	-16.54	16.3	20.8	107.6	11.2	138
1985	2	18	.0	2446114.5	5 1.412	+13 11.32	5 3.383	+13 14.27	4.46	13.35	4.83	-16.55	16.3	20.8	106.5	11.3	126
1985	2	19	.0	2446115.5	5 .839	+13 13.41	5 2.811	+13 16.38	4.46	13.53	4.82	-16.57	16.3	20.8	105.4	11.4	113
1985	2	20	.0	2446116.5	5 .283	+13 15.51	5 2.255	+13 18.52	4.47	13.68	4.81	-16.59	16.3	20.8	104.3	11.5	101
1985	2	21	.0	2446117.5	4 59.744	+13 17.64	5 1.716	+13 20.67	4.48	13.83	4.80	-16.60	16.3	20.8	103.1	11.6	89
1985	2	22	.0	2446118.5	4 59.222	+13 19.79	5 1.194	+13 22.84	4.49	13.96	4.79	-16.62	16.3	20.8	102.0	11.6	77
1985	2	23	.0	2446119.5	4 58.717	+13 21.95	5 .689	+13 25.04	4.50	14.08	4.78	-16.64	16.3	20.8	100.9	11.7	65
1985	2	24	.0	2446120.5	4 58.229	+13 24.14	5 .201	+13 27.25	4.50	14.19	4.77	-16.65	16.3	20.8	99.8	11.8	53
1985	2	25	.0	2446121.5	4 57.758	+13 26.34	4 59.730	+13 29.47	4.51	14.29	4.76	-16.67	16.3	20.8	98.7	11.9	42
1985	2	26	.0	2446122.5	4 57.304	+13 28.57	4 59.275	+13 31.72	4.52	14.37	4.75	-16.69	16.3	20.8	97.6	11.9	31
1985	2	27	.0	2446123.5	4 56.867	+13 30.81	4 58.838	+13 33.98	4.53	14.44	4.74	-16.70	16.3	20.8	96.5	12.0	20
1985	2	28	.0	2446124.5	4 56.446	+13 33.07	4 58.[illegible]18	+13 36.26	4.54	14.50	4.73	-16.72	16.2	20.8	95.4	12.0	12
1985	3	1	.0	2446125.5	4 56.043	+13 35.35	4 58.014	+13 38.56	4.55	14.54	4.73	-16.74	16.2	20.8	94.3	12.1	13
1985	3	2	.0	2446126.5	4 55.656	+13 37.64	4 57.628	+13 40.87	4.55	14.58	4.72	-16.76	16.2	20.8	93.3	12.1	23
1985	3	3	.0	2446127.5	4 55.285	+13 39.95	4 57.257	+13 43.20	4.56	14.60	4.71	-16.77	16.2	20.8	92.2	12.2	35
1985	3	4	.0	2446128.5	4 54.931	+13 42.28	4 56.903	+13 45.55	4.57	14.61	4.70	-16.79	16.2	20.8	91.1	12.2	48
1985	3	5	.0	2446129.5	4 54.593	+13 44.62	4 56.566	+13 47.90	4.58	14.61	4.69	-16.81	16.2	20.8	90.1	12.2	62
1985	3	6	.0	2446130.5	4 54.272	+13 46.98	4 56.245	+13 50.28	4.59	14.60	4.68	-16.83	16.2	20.8	89.0	12.2	76
1985	3	7	.0	2446131.5	4 53.967	+13 49.35	4 55.940	+13 52.66	4.60	14.58	4.67	-16.84	16.2	20.8	87.9	12.3	90
1985	3	8	.0	2446132.5	4 53.678	+13 51.73	4 55.651	+13 55.06	4.60	14.55	4.66	-16.86	16.2	20.8	86.9	12.3	105
1985	3	9	.0	2446133.5	4 53.404	+13 54.13	4 55.377	+13 57.47	4.61	14.51	4.65	-16.88	16.2	20.8	85.8	12.3	120
1985	3	10	.0	2446134.5	4 53.147	+13 56.54	4 55.120	+13 59.89	4.62	14.46	4.64	-16.90	16.2	20.8	84.8	12.3	135
1985	3	11	.0	2446135.5	4 52.906	+13 58.96	4 54.879	+14 2.33	4.63	14.40	4.63	-16.92	16.2	20.8	83.7	12.3	149
1985	3	12	.0	2446136.5	4 52.680	+14 1.40	4 54.653	+14 4.77	4.64	14.33	4.62	-16.93	16.2	20.8	82.7	12.3	162
1985	3	13	.0	2446137.5	4 52.4[illegible]0	+14 3.84	4 54.443	+14 7.23	4.65	14.25	4.61	-16.95	16.2	20.8	81.7	12.3	169
1985	3	14	.0	2446138.5	4 52.275	+14 6.30	4 54.249	+14 9.70	4.65	14.16	4.60	-16.97	16.2	20.8	80.6	12.3	163
1985	3	15	.0	2446139.5	4 52.096	+14 8.77	4 54.070	+14 12.18	4.66	14.06	4.59	-16.99	16.2	20.8	79.6	12.3	151
1985	3	16	.0	2446140.5	4 51.932	+14 11.26	4 53.906	+14 14.67	4.67	13.95	4.58	-17.01	16.2	20.8	78.6	12.3	139
1985	3	17	.0	2446141.5	4 51.783	+14 13.75	4 53.758	+14 17.17	4.68	13.82	4.57	-17.02	16.1	20.7	77.6	12.3	127
1985	3	18	.0	2446142.5	4 51.649	+14 16.25	4 53.624	+14 19.68	4.69	13.69	4.56	-17.04	16.1	20.7	76.6	12.3	114

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	3	19	.0	2446143.5	4 51.530	+14 18.76	4 53.505	+14 22.19	4.69	13.55	4.55	-17.06	16.1	20.7	75.6	12.2	102
1985	3	20	.0	2446144.5	4 51.426	+14 21.28	4 53.401	+14 24.72	4.70	13.40	4.54	-17.08	16.1	20.7	74.5	12.2	90
1985	3	21	.0	2446145.5	4 51.336	+14 23.80	4 53.312	+14 27.25	4.71	13.24	4.53	-17.10	16.1	20.7	73.5	12.2	78
1985	3	22	.0	2446146.5	4 51.261	+14 26.34	4 53.237	+14 29.79	4.72	13.07	4.52	-17.12	16.1	20.7	72.5	12.1	67
1985	3	23	.0	2446147.5	4 51.200	+14 28.88	4 53.176	+14 32.33	4.73	12.89	4.51	-17.14	16.1	20.7	71.6	12.1	55
1985	3	24	.0	2446148.5	4 51.154	+14 31.43	4 53.130	+14 34.88	4.73	12.70	4.50	-17.15	16.1	20.7	70.6	12.1	44
1985	3	25	.0	2446149.5	4 51.121	+14 33.99	4 53.098	+14 37.44	4.74	12.50	4.49	-17.17	16.1	20.7	69.6	12.0	32
1985	3	26	.0	2446150.5	4 51.102	+14 36.55	4 53.079	+14 40.00	4.75	12.30	4.48	-17.19	16.1	20.7	68.6	12.0	21
1985	3	27	.0	2446151.5	4 51.097	+14 39.11	4 53.075	+14 42.57	4.75	12.08	4.47	-17.21	16.1	20.7	67.6	11.9	12
1985	3	28	.0	2446152.5	4 51.106	+14 41.69	4 53.083	+14 45.14	4.76	11.86	4.46	-17.23	16.1	20.7	66.6	11.9	10
1985	3	29	.0	2446153.5	4 51.127	+14 44.26	4 53.106	+14 47.71	4.77	11.63	4.45	-17.25	16.1	20.7	65.7	11.8	19
1985	3	30	.0	2446154.5	4 51.162	+14 46.84	4 53.141	+14 50.29	4.77	11.39	4.44	-17.27	16.1	20.7	64.7	11.7	31
1985	3	31	.0	2446155.5	4 51.211	+14 49.42	4 53.190	+14 52.87	4.78	11.14	4.43	-17.29	16.0	20.7	63.7	11.7	43
1985	4	1	.0	2446156.5	4 51.271	+14 52.00	4 53.251	+14 55.45	4.79	10.89	4.42	-17.31	16.0	20.7	62.8	11.6	56
1985	4	2	.0	2446157.5	4 51.345	+14 54.59	4 53.325	+14 58.04	4.79	10.63	4.41	-17.33	16.0	20.7	61.8	11.5	70
1985	4	3	.0	2446158.5	4 51.431	+14 57.18	4 53.411	+15 .62	4.80	10.36	4.40	-17.35	16.0	20.7	60.9	11.4	84
1985	4	4	.0	2446159.5	4 51.529	+14 59.77	4 53.510	+15 3.21	4.81	10.09	4.39	-17.37	16.0	20.7	59.9	11.4	99
1985	4	5	.0	2446160.5	4 51.640	+15 2.36	4 53.621	+15 5.79	4.81	9.81	4.38	-17.38	16.0	20.7	59.0	11.3	114
1985	4	6	.0	2446161.5	4 51.762	+15 4.95	4 53.744	+15 8.38	4.82	9.53	4.37	-17.40	16.0	20.7	58.0	11.2	129
1985	4	7	.0	2446162.5	4 51.897	+15 7.54	4 53.879	+15 10.96	4.82	9.24	4.36	-17.42	16.0	20.7	57.1	11.1	143
1985	4	8	.0	2446163.5	4 52.043	+15 10.14	4 54.025	+15 13.55	4.83	8.94	4.35	-17.44	16.0	20.7	56.2	11.0	157
1985	4	9	.0	2446164.5	4 52.201	+15 12.73	4 54.184	+15 16.13	4.83	8.64	4.34	-17.46	16.0	20.7	55.2	10.9	169
1985	4	10	.0	2446165.5	4 52.370	+15 15.32	4 54.353	+15 18.71	4.84	8.33	4.33	-17.48	16.0	20.7	54.3	10.8	167
1985	4	11	.0	2446166.5	4 52.551	+15 17.91	4 54.535	+15 21.29	4.84	8.01	4.32	-17.50	15.9	20.7	53.4	10.7	155
1985	4	12	.0	2446167.5	4 52.743	+15 20.50	4 54.727	+15 23.87	4.85	7.69	4.31	-17.52	15.9	20.7	52.5	10.6	143
1985	4	13	.0	2446168.5	4 52.945	+15 23.08	4 54.931	+15 26.45	4.85	7.36	4.30	-17.54	15.9	20.7	51.5	10.5	130
1985	4	14	.0	2446169.5	4 53.159	+15 25.67	4 55.145	+15 29.02	4.86	7.03	4.29	-17.56	15.9	20.7	50.6	10.4	118
1985	4	15	.0	2446170.5	4 53.384	+15 28.25	4 55.370	+15 31.60	4.86	6.69	4.28	-17.58	15.9	20.7	49.7	10.3	106
1985	4	16	.0	2446171.5	4 53.619	+15 30.82	4 55.606	+15 34.16	4.86	6.34	4.27	-17.61	15.9	20.7	48.8	10.2	94
1985	4	17	.0	2446172.5	4 53.865	+15 33.40	4 55.852	+15 36.73	4.87	5.99	4.26	-17.63	15.9	20.7	47.9	10.1	82
1985	4	18	.0	2446173.5	4 54.121	+15 35.97	4 56.108	+15 39.28	4.87	5.63	4.25	-17.65	15.9	20.7	47.0	10.0	70
1985	4	19	.0	2446174.5	4 54.387	+15 38.54	4 56.375	+15 41.84	4.87	5.27	4.24	-17.67	15.9	20.7	46.1	9.8	59
1985	4	20	.0	2446175.5	4 54.663	+15 41.10	4 56.652	+15 44.38	4.88	4.90	4.23	-17.69	15.9	20.7	45.2	9.7	47
1985	4	21	.0	2446176.5	4 54.950	+15 43.65	4 56.938	+15 46.93	4.88	4.53	4.22	-17.71	15.9	20.7	44.3	9.6	36
1985	4	22	.0	2446177.5	4 55.248	+15 46.20	4 57.235	+15 49.46	4.88	4.15	4.21	-17.73	15.8	20.7	43.4	9.5	25
1985	4	23	.0	2446178.5	4 55.551	+15 48.75	4 57.541	+15 51.99	4.88	3.76	4.20	-17.75	15.8	20.7	42.5	9.3	14
1985	4	24	.0	2446179.5	4 55.866	+15 51.29	4 57.856	+15 54.51	4.89	3.38	4.19	-17.77	15.8	20.7	41.7	9.2	9
1985	4	25	.0	2446180.5	4 56.190	+15 53.82	4 58.181	+15 57.03	4.89	2.98	4.18	-17.79	15.8	20.6	40.8	9.0	15
1985	4	26	.0	2446181.5	4 56.523	+15 56.34	4 58.514	+15 59.54	4.89	2.59	4.17	-17.81	15.8	20.6	39.9	8.9	26
1985	4	27	.0	2446182.5	4 56.865	+15 58.86	4 58.857	+16 2.04	4.89	2.19	4.16	-17.84	15.8	20.6	39.0	8.8	38
1985	4	28	.0	2446183.5	4 57.215	+16 1.36	4 59.208	+16 4.53	4.89	1.78	4.15	-17.86	15.8	20.6	38.1	8.6	50
1985	4	29	.0	2446184.5	4 57.575	+16 3.86	4 59.568	+16 7.01	4.89	1.38	4.14	-17.88	15.8	20.6	37.3	8.5	63
1985	4	30	.0	2446185.5	4 57.942	+16 6.35	4 59.937	+16 9.48	4.89	.97	4.13	-17.90	15.7	20.6	36.4	8.3	77
1985	5	1	.0	2446186.5	4 58.318	+16 8.83	5 .313	+16 11.95	4.89	.55	4.12	-17.92	15.7	20.6	35.5	8.2	91
1985	5	2	.0	2446187.5	4 58.703	+16 11.31	5 .698	+16 14.40	4.89	.14	4.11	-17.94	15.7	20.6	34.7	8.0	105
1985	5	3	.0	2446188.5	4 59.095	+16 13.77	5 1.091	+16 16.84	4.89	-.28	4.09	-17.97	15.7	20.6	33.8	7.9	120
1985	5	4	.0	2446189.5	4 59.495	+16 16.22	5 1.491	+16 19.28	4.89	-.70	4.08	-17.99	15.7	20.6	33.0	7.7	135
1985	5	5	.0	2446190.5	4 59.903	+16 18.66	5 1.900	+16 21.70	4.89	-1.13	4.07	-18.01	15.7	20.6	32.1	7.6	149
1985	5	6	.0	2446191.5	5 .318	+16 21.10	5 2.316	+16 24.11	4.89	-1.55	4.06	-18.03	15.7	20.6	31.3	7.4	163
1985	5	7	.0	2446192.5	5 .741	+16 23.52	5 2.740	+16 26.51	4.89	-1.98	4.05	-18.05	15.7	20.6	30.4	7.2	171
1985	5	8	.0	2446193.5	5 1.172	+16 25.93	5 3.171	+16 28.90	4.89	-2.41	4.04	-18.08	15.7	20.6	29.6	7.1	162
1985	5	9	.0	2446194.5	5 1.609	+16 28.33	5 3.610	+16 31.28	4.89	-2.85	4.03	-18.10	15.6	20.6	28.7	6.9	149
1985	5	10	.0	2446195.5	5 2.054	+16 30.72	5 4.056	+16 33.65	4.89	-3.29	4.02	-18.12	15.6	20.6	[illegible]	6.7	137
1985	5	11	.0	2446196.5	5 2.506	+16 33.09	5 4.508	+16 36.01	4.88	-3.73	4.01	-18.14	15.6	20.6	[illegible]	6.6	124
1985	5	12	.0	2446197.5	5 2.965	+16 35.46	5 4.968	+16 38.35	4.88	-4.17	4.00	-18.17	15.6	20.6	[illegible]	6.4	112
1985	5	13	.0	2446198.5	5 3.431	+16 37.81	5 5.434	+16 40.68	4.88	-4.62	3.99	-18.19	15.6	20.5	[illegible]	6.2	100

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	5	14	.0	2446199.5	5 3.904	+16 40.15	5 5.908	+16 43.00	4.88	-5.07	3.98	-18.21	15.6	20.5	24.6	6.1	84
1985	5	15	.0	2446200.5	5 4.383	+16 42.48	5 6.387	+16 45.30	4.87	-5.52	3.97	-18.24	15.6	20.5	23.7	5.9	76
1985	5	16	.0	2446201.5	5 4.869	+16 44.80	5 6.874	+16 47.59	4.87	-5.98	3.96	-18.26	15.5	20.5	22.9	5.7	64
1985	5	17	.0	2446202.5	5 5.361	+16 47.10	5 7.366	+16 49.87	4.87	-6.43	3.95	-18.28	15.5	20.5	22.1	5.5	53
1985	5	18	.0	2446203.5	5 5.858	+16 49.39	5 7.865	+16 52.14	4.86	-6.89	3.94	-18.30	15.5	20.5	21.3	5.4	41
1985	5	19	.0	2446204.5	5 6.363	+16 51.66	5 8.370	+16 54.39	4.86	-7.35	3.93	-18.33	15.5	20.5	20.5	5.2	30
1985	5	20	.0	2446205.5	5 6.873	+16 53.92	5 8.881	+16 56.62	4.85	-7.82	3.92	-18.35	15.5	20.5	19.7	5.0	19
1985	5	21	.0	2446206.5	5 7.389	+16 56.17	5 9.398	+16 58.84	4.85	-8.28	3.91	-18.38	15.5	20.6	18.9	4.8	10
1985	5	22	.0	2446207.5	5 7.911	+16 58.40	5 9.920	+17 1.05	4.84	-8.75	3.90	-18.40	15.5	20.5	18.1	4.6	10
1985	5	23	.0	2446208.5	5 8.438	+17 .61	5 10.448	+17 3.24	4.84	-9.22	3.88	-18.42	15.4	20.5	17.3	4.4	20
1985	5	24	.0	2446209.5	5 8.971	+17 2.81	5 10.982	+17 5.41	4.83	-9.69	3.87	-18.45	15.4	20.5	16.5	4.3	32
1985	5	25	.0	2446210.5	5 9.508	+17 5.00	5 11.520	+17 7.57	4.83	-10.16	3.86	-18.47	15.4	20.5	15.7	4.1	44
1985	5	26	.0	2446211.5	5 10.051	+17 7.17	5 12.064	+17 9.72	4.82	-10.63	3.85	-18.49	15.4	20.4	14.9	3.9	57
1985	5	27	.0	2446212.5	5 10.599	+17 9.32	5 12.613	+17 11.85	4.82	-11.10	3.84	-18.52	15.4	20.4	14.2	3.7	70
1985	5	28	.0	2446213.5	5 11.152	+17 11.46	5 13.166	+17 13.96	4.81	-11.58	3.83	-18.54	15.4	20.4	13.4	3.5	83
1985	5	29	.0	2446214.5	5 11.710	+17 13.58	5 13.724	+17 16.05	4.80	-12.05	3.82	-18.57	15.3	20.4	12.7	3.3	97
1985	5	30	.0	2446215.5	5 12.272	+17 15.69	5 14.287	+17 18.13	4.80	-12.52	3.81	-18.59	15.3	20.4	11.9	3.2	111
1985	5	31	.0	2446216.5	5 12.839	+17 17.78	5 14.855	+17 20.19	4.79	-12.99	3.80	-18.62	15.3	20.4	11.2	3.0	125
1985	6	1	.0	2446217.5	5 13.410	+17 19.85	5 15.426	+17 22.24	4.78	-13.47	3.79	-18.64	15.3	20.4	10.5	2.8	140
1985	6	2	.0	2446218.5	5 13.985	+17 21.91	5 16.003	+17 24.26	4.77	-13.94	3.78	-18.67	15.3	20.4	9.8	2.6	154
1985	6	3	.0	2446219.5	5 14.565	+17 23.95	5 16.583	+17 26.28	4.76	-14.41	3.77	-18.69	15.3	20.4	9.1	2.5	167
1985	6	4	.0	2446220.5	5 15.148	+17 25.97	5 17.168	+17 28.27	4.76	-14.89	3.76	-18.72	15.2	20.4	8.5	2.3	170
1985	6	5	.0	2446221.5	5 15.736	+17 27.98	5 17.757	+17 30.25	4.75	-15.36	3.75	-18.74	15.2	20.3	7.9	2.1	158
1985	6	6	.0	2446222.5	5 16.328	+17 29.97	5 18.349	+17 32.21	4.74	-15.83	3.73	-18.77	15.2	20.3	7.3	2.0	145
1985	6	7	.0	2446223.5	5 16.924	+17 31.94	5 18.946	+17 34.15	4.73	-16.31	3.72	-18.79	15.2	20.3	6.8	1.9	132
1985	6	8	.0	2446224.5	5 17.523	+17 33.89	5 19.546	+17 36.08	4.72	-16.79	3.71	-18.82	15.2	20.3	6.3	1.7	119
1985	6	9	.0	2446225.5	5 18.126	+17 35.83	5 20.150	+17 37.99	4.71	-17.26	3.70	-18.84	15.1	20.3	6.0	1.6	107
1985	6	10	.0	2446226.5	5 18.732	+17 37.75	5 20.757	+17 39.88	4.70	-17.74	3.69	-18.87	15.1	20.3	5.7	1.6	95
1985	6	11	.0	2446227.5	5 19.342	+17 39.66	5 21.367	+17 41.75	4.69	-18.22	3.68	-18.90	15.1	20.3	5.5	1.5	83
1985	6	12	.0	2446228.5	5 19.956	+17 41.54	5 21.981	+17 43.61	4.68	-18.70	3.67	-18.92	15.1	20.3	5.4	1.5	71
1985	6	13	.0	2446229.5	5 20.572	+17 43.41	5 22.598	+17 45.44	4.67	-19.17	3.66	-18.95	15.1	20.3	5.5	1.5	60
1985	6	14	.0	2446230.5	5 21.192	+17 45.26	5 23.219	+17 47.26	4.66	-19.65	3.65	-18.97	15.0	20.2	5.6	1.6	48
1985	6	15	.0	2446231.5	5 21.814	+17 47.09	5 23.842	+17 49.06	4.65	-20.13	3.64	-19.00	15.0	20.2	5.9	1.6	37
1985	6	16	.0	2446232.5	5 22.440	+17 48.90	5 24.468	+17 50.84	4.63	-20.61	3.63	-19.03	15.0	20.2	6.3	1.8	26
1985	6	17	.0	2446233.5	5 23.068	+17 50.69	5 25.097	+17 52.61	4.62	-21.09	3.61	-19.05	15.0	20.2	6.7	1.9	15
1985	6	18	.0	2446234.5	5 23.698	+17 52.47	5 25.729	+17 54.35	4.61	-21.56	3.60	-19.08	15.0	20.2	7.2	2.0	8
1985	6	19	.0	2446235.5	5 24.331	+17 54.23	5 26.363	+17 56.08	4.60	-22.04	3.59	-19.11	14.9	20.2	7.8	2.2	14
1985	6	20	.0	2446236.5	5 24.967	+17 55.97	5 26.999	+17 57.79	4.58	-22.52	3.58	-19.13	14.9	20.2	8.3	2.4	25
1985	6	21	.0	2446237.5	5 25.605	+17 57.69	5 27.638	+17 59.48	4.57	-22.99	3.57	-19.16	14.9	20.2	9.0	2.5	37
1985	6	22	.0	2446238.5	5 26.244	+17 59.39	5 28.278	+18 1.15	4.56	-23.47	3.56	-19.19	14.9	20.1	9.6	2.7	50
1985	6	23	.0	2446239.5	5 26.886	+18 1.07	5 28.921	+18 2.80	4.54	-23.94	3.55	-19.22	14.9	20.1	10.3	2.9	63
1985	6	24	.0	2446240.5	5 27.530	+18 2.74	5 29.565	+18 4.43	4.53	-24.41	3.54	-19.24	14.8	20.1	11.0	3.1	76
1985	6	25	.0	2446241.5	5 28.175	+18 4.38	5 30.211	+18 6.04	4.51	-24.88	3.53	-19.27	14.8	20.1	11.7	3.3	90
1985	6	26	.0	2446242.5	5 28.822	+18 6.01	5 30.858	+18 7.64	4.50	-25.35	3.51	-19.30	14.8	20.1	12.4	3.6	103
1985	6	27	.0	2446243.5	5 29.470	+18 7.61	5 31.507	+18 9.22	4.49	-25.81	3.50	-19.33	14.8	20.1	13.1	3.8	117
1985	6	28	.0	2446244.5	5 30.120	+18 9.20	5 32.158	+18 10.77	4.47	-26.28	3.49	-19.35	14.8	20.1	13.8	4.0	131
1985	6	29	.0	2446245.5	5 30.771	+18 10.77	5 32.809	+18 12.31	4.46	-26.74	3.48	-19.38	14.7	20.1	14.6	4.2	145
1985	6	30	.0	2446246.5	5 31.423	+18 12.33	5 33.462	+18 13.83	4.44	-27.20	3.47	-19.41	14.7	20.0	15.3	4.4	159
1985	7	1	.0	2446247.5	5 32.076	+18 13.86	5 34.116	+18 15.35	4.42	-27.66	3.46	-19.44	14.7	20.0	16.1	4.7	170
1985	7	2	.0	2446248.5	5 32.730	+18 15.38	5 34.771	+18 16.81	4.41	-28.12	3.45	-19.47	14.7	20.0	16.8	4.9	167
1985	7	3	.0	2446249.5	5 33.385	+18 16.87	5 35.427	+18 18.28	4.39	-28.57	3.44	-19.50	14.6	20.0	17.6	5.1	155
1985	7	4	.0	2446250.5	5 34.040	+18 18.35	5 36.083	+18 19.73	4.37	-29.03	3.42	-19.53	14.6	20.0	18.3	5.4	142
1985	7	5	.0	2446251.5	5 34.697	+18 19.81	5 36.741	+18 21.15	4.36	-29.48	3.41	-19.55	14.6	20.0	19.1	5.6	129
1985	7	6	.0	2446252.5	5 35.353	+18 21.26	5 37.398	+18 22.57	4.34	-29.94	3.40	-19.58	14.6	19.9	19.9	5.8	116
1985	7	7	.0	2446253.5	5 36.011	+18 22.68	5 38.056	+18 23.96	4.32	-30.39	3.39	-19.61	14.5	19.9	20.6	6.1	103
1985	7	8	.0	2446254.5	5 36.669	+18 24.09	5 38.715	+18 25.33	4.31	-30.84	3.38	-19.64	14.5	19.9	21.4	6.3	91

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	7	9	.0	2446255.5	5 37.326	+18 25.48	5 39.373	+18 26.69	4.29	-31.29	3.37	-19.67	14.5	19.9	22.2	6.5	79
1985	7	10	.0	2446256.5	5 37.984	+18 26.86	5 40.032	+18 28.03	4.27	-31.73	3.36	-19.70	14.5	19.9	22.9	6.8	68
1985	7	11	.0	2446257.5	5 38.642	+18 28.20	5 40.690	+18 29.35	4.25	-32.18	3.35	-19.73	14.4	19.9	23.7	7.0	56
1985	7	12	.0	2446258.5	5 39.300	+18 29.54	5 41.349	+18 30.66	4.23	-32.62	3.33	-19.76	14.4	19.8	24.5	7.3	45
1985	7	13	.0	2446259.5	5 39.957	+18 30.86	5 42.007	+18 31.94	4.21	-33.07	3.32	-19.79	14.4	19.8	25.3	7.5	33
1985	7	14	.0	2446260.5	5 40.614	+18 32.16	5 42.664	+18 33.21	4.19	-33.51	3.31	-19.82	14.4	19.8	26.0	7.7	22
1985	7	15	.0	2446261.5	5 41.270	+18 33.45	5 43.321	+18 34.46	4.17	-33.94	3.30	-19.85	14.3	19.8	26.8	8.0	12
1985	7	16	.0	2446262.5	5 41.926	+18 34.71	5 43.978	+18 35.69	4.15	-34.38	3.29	-19.88	14.3	19.8	27.6	8.2	8
1985	7	17	.0	2446263.5	5 42.580	+18 35.96	5 44.633	+18 36.91	4.13	-34.82	3.28	-19.91	14.3	19.8	28.4	8.5	17
1985	7	18	.0	2446264.5	5 43.234	+18 37.20	5 45.287	+18 38.11	4.11	-35.25	3.27	-19.95	14.2	19.7	29.2	8.7	29
1985	7	19	.0	2446265.5	5 43.886	+18 38.41	5 45.940	+18 39.30	4.09	-35.68	3.25	-19.98	14.2	19.7	30.0	9.0	42
1985	7	20	.0	2446266.5	5 44.537	+18 39.61	5 46.592	+18 40.47	4.07	-36.10	3.24	-20.01	14.2	19.7	30.7	9.2	55
1985	7	21	.0	2446267.5	5 45.186	+18 40.80	5 47.241	+18 41.62	4.05	-36.52	3.23	-20.04	14.2	19.7	31.5	9.5	69
1985	7	22	.0	2446268.5	5 45.833	+18 41.96	5 47.889	+18 42.76	4.03	-36.94	3.22	-20.07	14.1	19.7	32.3	9.7	82
1985	7	23	.0	2446269.5	5 46.479	+18 43.12	5 48.535	+18 43.88	4.01	-37.36	3.21	-20.10	14.1	19.6	33.1	10.0	96
1985	7	24	.0	2446270.5	5 47.122	+18 44.25	5 49.179	+18 44.98	3.99	-37.77	3.20	-20.13	14.1	19.6	33.9	10.2	110
1985	7	25	.0	2446271.5	5 47.763	+18 45.37	5 49.821	+18 46.07	3.97	-38.18	3.18	-20.17	14.0	19.6	34.7	10.5	124
1985	7	26	.0	2446272.5	5 48.402	+18 46.48	5 50.461	+18 47.14	3.94	-38.59	3.17	-20.20	14.0	19.6	35.5	10.7	137
1985	7	27	.0	2446273.5	5 49.038	+18 47.57	5 51.098	+18 48.20	3.92	-38.99	3.16	-20.23	14.0	19.6	36.3	11.0	151
1985	7	28	.0	2446274.5	5 49.672	+18 48.65	5 51.732	+18 49.25	3.90	-39.39	3.15	-20.26	14.0	19.5	37.1	11.2	164
1985	7	29	.0	2446275.5	5 50.303	+18 49.72	5 52.364	+18 50.28	3.88	-39.79	3.14	-20.30	13.9	19.5	37.9	11.5	171
1985	7	30	.0	2446276.5	5 50.930	+18 50.77	5 52.992	+18 51.30	3.85	-40.18	3.13	-20.33	13.9	19.5	38.7	11.7	163
1985	7	31	.0	2446277.5	5 51.555	+18 51.81	5 53.618	+18 52.31	3.83	-40.57	3.11	-20.36	13.9	19.5	39.5	12.0	151
1985	8	1	.0	2446278.5	5 52.176	+18 52.83	5 54.240	+18 53.31	3.81	-40.95	3.10	-20.40	13.8	19.5	40.3	12.2	138
1985	8	2	.0	2446279.5	5 52.794	+18 53.85	5 54.859	+18 54.29	3.78	-41.34	3.09	-20.43	13.8	19.4	41.1	12.5	125
1985	8	3	.0	2446280.5	5 53.408	+18 54.85	5 55.474	+18 55.26	3.76	-41.72	3.08	-20.46	13.8	19.4	41.9	12.7	112
1985	8	4	.0	2446281.5	5 54.019	+18 55.84	5 56.085	+18 56.22	3.73	-42.10	3.07	-20.50	13.7	19.4	42.7	13.0	100
1985	8	5	.0	2446282.5	5 54.626	+18 56.82	5 56.692	+18 57.17	3.71	-42.47	3.05	-20.53	13.7	19.4	43.5	13.2	88
1985	8	6	.0	2446283.5	5 55.228	+18 57.79	5 57.295	+18 58.11	3.69	-42.85	3.04	-20.57	13.7	19.3	44.3	13.5	76
1985	8	7	.0	2446284.5	5 55.828	+18 58.75	5 57.893	+18 59.04	3.66	-43.22	3.03	-20.60	13.6	19.3	45.1	13.7	64
1985	8	8	.0	2446285.5	5 56.420	+18 59.70	5 58.487	+18 59.96	3.64	-43.58	3.02	-20.63	13.6	19.3	45.9	14.0	53
1985	8	9	.0	2446286.5	5 57.009	+19 .64	5 59.076	+19 .87	3.61	-43.95	3.01	-20.67	13.6	19.3	46.7	14.2	41
1985	8	10	.0	2446287.5	5 57.592	+19 1.57	5 59.661	+19 1.77	3.58	-44.31	3.00	-20.70	13.5	19.3	47.6	14.5	30
1985	8	11	.0	2446288.5	5 58.170	+19 2.49	6 .239	+19 2.66	3.56	-44.66	2.98	-20.74	13.5	19.2	48.4	14.7	19
1985	8	12	.0	2446289.5	5 58.742	+19 3.40	6 .813	+19 3.55	3.53	-45.02	2.97	-20.77	13.5	19.2	49.2	15.0	9
1985	8	13	.0	2446290.5	5 59.309	+19 4.31	6 1.380	+19 4.42	3.51	-45.36	2.96	-20.81	13.4	19.2	50.0	15.2	10
1985	8	14	.0	2446291.5	5 59.869	+19 5.21	6 1.941	+19 5.30	3.48	-45.71	2.95	-20.85	13.4	19.2	50.8	15.5	21
1985	8	15	.0	2446292.5	6 .424	+19 6.11	6 2.496	+19 6.16	3.45	-46.05	2.94	-20.88	13.4	19.1	51.7	15.7	34
1985	8	16	.0	2446293.5	6 .971	+19 6.99	6 3.045	+19 7.03	3.43	-46.39	2.92	-20.92	13.3	19.1	52.5	15.9	47
1985	8	17	.0	2446294.5	6 1.512	+19 7.88	6 3.586	+19 7.88	3.40	-46.72	2.91	-20.95	13.3	19.1	53.3	16.2	60
1985	8	18	.0	2446295.5	6 2.045	+19 8.76	6 4.120	+19 8.74	3.37	-47.04	2.90	-20.99	13.2	19.1	54.1	16.4	74
1985	8	19	.0	2446296.5	6 2.571	+19 9.64	6 4.646	+19 9.59	3.35	-47.36	2.89	-21.03	13.2	19.0	55.0	16.7	88
1985	8	20	.0	2446297.5	6 3.088	+19 10.51	6 5.164	+19 10.44	3.32	-47.68	2.87	-21.07	13.2	19.0	55.8	16.9	102
1985	8	21	.0	2446298.5	6 3.598	+19 11.38	6 5.674	+19 11.28	3.29	-47.99	2.86	-21.10	13.1	19.0	56.7	17.2	117
1985	8	22	.0	2446299.5	6 4.099	+19 12.26	6 6.176	+19 12.13	3.26	-48.30	2.85	-21.14	13.1	18.9	57.5	17.4	131
1985	8	23	.0	2446300.5	6 4.591	+19 13.13	6 6.668	+19 12.98	3.24	-48.60	2.84	-21.18	13.0	18.9	58.3	17.7	144
1985	8	24	.0	2446301.5	6 5.074	+19 14.00	6 7.152	+19 13.83	3.21	-48.89	2.83	-21.22	13.0	18.9	59.2	17.9	158
1985	8	25	.0	2446302.5	6 5.547	+19 14.88	6 7.627	+19 14.68	3.18	-49.18	2.81	-21.25	13.0	18.9	60.0	18.1	169
1985	8	26	.0	2446303.5	6 6.011	+19 15.76	6 8.091	+19 15.53	3.15	-49.47	2.80	-21.29	12.9	18.8	60.9	18.4	169
1985	8	27	.0	2446304.5	6 6.465	+19 16.64	6 8.545	+19 16.39	3.12	-49.75	2.79	-21.33	12.9	18.8	61.7	18.6	158
1985	8	28	.0	2446305.5	6 6.908	+19 17.53	6 8.989	+19 17.26	3.09	-50.03	2.78	-21.37	12.8	18.8	62.6	18.8	145
1985	8	29	.0	2446306.5	6 7.340	+19 18.42	6 9.422	+19 18.13	3.06	-50.30	2.76	-21.41	12.8	18.7	63.5	19.1	132
1985	8	30	.0	2446307.5	6 7.760	+19 19.32	6 9.843	+19 19.01	3.03	-50.57	2.75	-21.45	12.8	18.7	64.3	19.3	120
1985	8	31	.0	2446308.5	6 8.169	+19 20.23	6 10.253	+19 19.90	3.01	-50.83	2.74	-21.49	12.7	18.7	65.2	19.5	107
1985	9	1	.0	2446309.5	6 8.566	+19 21.15	6 10.650	+19 20.80	2.98	-51.09	2.73	-21.53	12.7	18.6	66.1	19.8	95
1985	9	2	.0	2446310.5	6 8.951	+19 22.07	6 11.035	+19 21.70	2.95	-51.34	2.71	-21.57	12.6	18.6	66.9	20.0	83

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)		DEC.		R.A. (APPN)		DEC.		DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	9	3	.0	2446311.5	6	9.322	+19	23.01	6	11.407	+19	22.63	2.92	-51.59	2.70	-21.61	12.6	18.6	67.8	20.2	71
1985	9	4	.0	2446312.5	6	9.679	+19	23.97	6	11.765	+19	23.56	2.89	-51.83	2.69	-21.65	12.5	18.6	68.7	20.4	60
1985	9	5	.0	2446313.5	6	10.023	+19	24.93	6	12.109	+19	24.51	2.86	-52.07	2.68	-21.69	12.5	18.5	69.6	20.7	48
1985	9	6	.0	2446314.5	6	10.351	+19	25.92	6	12.438	+19	25.47	2.83	-52.30	2.66	-21.73	12.5	18.5	70.5	20.9	36
1985	9	7	.0	2446315.5	6	10.665	+19	26.92	6	12.753	+19	26.46	2.80	-52.52	2.65	-21.77	12.4	18.5	71.4	21.1	25
1985	9	8	.0	2446316.5	6	10.962	+19	27.93	6	13.051	+19	27.46	2.77	-52.74	2.64	-21.81	12.4	18.4	72.3	21.3	14
1985	9	9	.0	2446317.5	6	11.243	+19	28.97	6	13.332	+19	28.48	2.74	-52.96	2.63	-21.85	12.3	18.4	73.2	21.5	8
1985	9	10	.0	2446318.5	6	11.506	+19	30.03	6	13.597	+19	29.52	2.70	-53.17	2.61	-21.89	12.3	18.3	74.1	21.7	14
1985	9	11	.0	2446319.5	6	11.752	+19	31.11	6	13.843	+19	30.59	2.67	-53.37	2.60	-21.93	12.2	18.3	75.0	21.9	26
1985	9	12	.0	2446320.5	6	11.978	+19	32.22	6	14.071	+19	31.69	2.64	-53.57	2.59	-21.98	12.2	18.3	75.9	22.1	39
1985	9	13	.0	2446321.5	6	12.186	+19	33.35	6	14.279	+19	32.81	2.61	-53.75	2.58	-22.02	12.1	18.[illegible]	76.8	22.4	52
1985	9	14	.0	2446322.5	6	12.373	+19	34.51	6	14.467	+19	33.96	2.58	-53.94	2.56	-22.06	12.1	18.2	77.7	22.5	66
1985	9	15	.0	2446323.5	6	12.539	+19	35.70	6	14.633	+19	35.14	2.55	-54.11	2.55	-22.10	12.0	18.2	78.7	22.7	81
1985	9	16	.0	2446324.5	6	12.683	+19	36.92	6	14.778	+19	36.36	2.52	-54.28	2.54	-22.15	12.0	18.1	79.6	22.9	95
1985	9	17	.0	2446325.5	6	12.804	+19	38.17	6	14.899	+19	37.61	2.49	-54.44	2.53	-22.19	11.9	18.1	80.6	23.1	110
1985	9	18	.0	2446326.5	6	12.901	+19	39.47	6	14.997	+19	38.89	2.46	-54.59	2.51	-22.24	11.9	18.1	81.5	23.3	124
1985	9	19	.0	2446327.5	6	12.973	+19	40.80	6	15.070	+19	40.22	2.42	-54[illegible]	2.50	-22.28	11.[illegible]	18.0	82.5	23.5	13[illegible]
1985	9	20	.0	2446328.5	6	13.019	+19	42.17	6	15.118	+19	41.59	2.39	-54.86	2.49	-22.32	11.8	18.0	83.4	23.7	153
1985	9	21	.0	2446329.5	6	13.039	+19	43.58	6	15.138	+19	43.00	2.36	-54.99	2.47	-22.37	11.7	17.9	84.4	23.8	165
1985	9	22	.0	2446330.5	6	13.030	+19	45.04	6	15.131	+19	44.46	2.33	-55.11	2.46	-22.41	11.6	17.9	85.4	24.0	171
1985	9	23	.0	2446331.5	6	12.992	+19	46.55	6	15.094	+19	45.97	2.30	-55.22	2.45	-22.46	11.6	17.8	86.4	24.1	162
1985	9	24	.0	2446332.5	6	12.924	+19	48.1[illegible]	6	15.027	+19	47.53	2.27	-55.32	2.43	-22.50	11.5	17.8	87.4	24.3	150
1985	9	25	.0	2446333.5	6	12.825	+19	49.72	6	14.928	+19	49.15	2.23	-55.41	2.42	-22.55	11.5	17.8	88.4	24.5	137
1985	9	26	.0	2446334.5	6	12.692	+19	51.39	6	14.797	+19	50.82	2.20	-55.50	2.41	-22.59	11.4	17.7	89.4	24.6	124
1985	9	27	.0	2446335.5	6	12.525	+19	53.11	6	14.630	+19	52.56	2.17	-55.58	2.40	-22.64	11.4	17.7	90.4	24.7	112
1985	9	28	.0	2446336.5	6	12.321	+19	54.90	6	14.428	+19	54.35	2.14	-55.65	2.38	-22.69	11.3	17.6	91.4	24.9	100
1985	9	29	.0	2446337.5	6	12.080	+19	56.75	6	14.188	+19	56.21	2.10	-55.71	2.37	-22.73	11.2	17.6	92.5	25.0	87
1985	9	30	.0	2446338.5	6	11.800	+19	58.66	6	13.908	+19	58.15	2.07	-55.76	2.36	-22.78	11.2	17.5	93.5	25.1	75
1985	10	1	.0	2446339.5	6	11.478	+20	.65	6	13.587	+20	.15	2.04	-55.80	2.34	-22.83	11.1	17.5	94.6	25.2	63
1985	10	2	.0	2446340.5	6	11.113	+20	2.71	6	13.223	+20	2.22	2.01	-55.83	2.33	-22.88	11.1	17.5	95.6	25.3	52
1985	10	3	.0	2446341.5	6	10.702	+20	4.84	6	12.814	+20	4.38	1.98	-55.85	2.32	-22.92	11.0	17.4	96.7	25.4	40
1985	10	4	.0	2446342.5	6	10.245	+20	7.06	6	12.357	+20	6.61	1.94	-55.86	2.30	-22.97	10.9	17.4	97.8	25.5	28
1985	10	5	.0	2446343.5	6	9.737	+20	9.35	6	11.851	+20	8.94	1.91	-55.86	2.29	-23.02	10.9	17.3	98.9	25.6	17
1985	10	6	.0	2446344.5	6	9.176	+20	11.73	6	11.292	+20	11.34	1.88	-55.85	2.28	-23.07	10.8	17.3	100.0	25.6	8
1985	10	7	.0	2446345.5	6	8.561	+20	14.20	6	10.678	+20	13.84	1.85	-55.83	2.26	-23.12	10.7	17.2	101.1	25.7	11
1985	10	8	.0	2446346.5	6	7.887	+20	16.76	6	10.006	+20	16.44	1.81	-55.79	2.25	-23.17	10.7	17.2	102.3	25.7	22
1985	10	9	.0	2446347.5	6	7.153	+20	19.42	6	9.272	+20	19.13	1.78	-55.74	2.24	-23.22	10.6	17.1	103.5	25.7	35
1985	10	10	.0	2446348.5	6	6.354	+20	22.17	6	8.475	+20	21.92	1.75	-55.68	2.22	-23.26	10.5	17.1	104.6	25.8	48
1985	10	11	.0	2446349.5	6	5.488	+20	25.02	6	7.610	+20	24.82	1.72	-55.60	2.21	-23.31	10.5	17.0	105.8	25.8	62
1985	10	12	.0	2446350.5	6	4.550	+20	27.97	6	6.673	+20	27.83	1.69	-55.50	2.20	-23.36	10.4	16.9	107.0	25.8	76
1985	10	13	.0	2446351.5	6	3.536	+20	31.04	6	5.661	+20	30.94	1.65	-55.39	2.18	-23.42	10.3	16.9	108.3	25.7	91
1985	10	14	.0	2446352.5	6	2.444	+20	34.21	6	4.570	+20	34.17	1.62	-55.26	2.17	-23.47	10.3	16.8	109.5	25.7	106
1985	10	15	.0	2446353.5	6	1.267	+20	37.49	6	3.395	+20	37.51	1.59	-55.12	2.16	-23.52	10.2	16.8	110.8	25.6	121
1985	10	16	.0	2446354.5	6	.002	+20	40.88	6	2.131	+20	40.97	1.56	-54.95	2.14	-23.57	10.1	16.7	112.1	25.5	136
1985	10	17	.0	2446355.5	5	58.643	+20	44.39	6	.774	+20	44.55	1.53	-54.77	2.13	-23.62	10.0	16.7	113.4	25.5	151
1985	10	18	.0	2446356.5	5	57.185	+20	48.02	5	59.318	+20	48.24	1.50	-54.56	2.11	-23.67	10.0	16.6	114.7	25.3	166
1985	10	19	.0	2446357.5	5	55.623	+20	51.76	5	57.757	+20	52.06	1.46	-54.33	2.10	-23.72	9.9	16.5	116.1	25.2	172
1985	10	20	.0	2446358.5	5	53.949	+20	55.61	5	56.086	+20	56.00	1.43	-54.08	2.09	-23.78	9.8	16.5	117.4	25.0	162
1985	10	21	.0	2446359.5	5	52.159	+20	59.57	5	54.297	+21	.06	1.40	-53.81	2.07	-23.83	9.7	16.4	118.9	24.9	148
1985	10	22	.0	2446360.5	5	50.244	+21	3.65	5	52.383	+21	4.24	1.37	-53.51	2.06	-23.88	9.6	16.4	120.3	24.7	135
1985	10	23	.0	2446361.5	5	48.197	+21	7.83	5	50.338	+21	8.52	1.34	-53.19	2.05	-23.94	9.6	16.3	121.8	24.4	122
1985	10	24	.0	2446362.5	5	46.009	+21	12.11	5	48.152	+21	12.91	1.31	-52.84	2.03	-23.99	9.5	16.2	123.3	24.2	109
1985	10	25	.0	2446363.5	5	43.673	+21	16.47	5	45.818	+21	17.40	1.28	-52.45	2.02	-24.04	9.4	16.2	124.8	23.9	96
1985	10	26	.0	2446364.5	5	41.179	+21	20.92	5	43.325	+21	21.98	1.25	-52.04	2.00	-24.10	9.3	16.1	126.4	23.5	83
1985	10	27	.0	2446365.5	5	38.517	+21	25.43	5	40.664	+21	26.63	1.22	-51.59	1.99	-24.15	9.2	16.0	128.0	23.2	71
1985	10	28	.0	2446366.5	5	35.675	+21	29.99	5	37.824	+21	31.3[illegible]	1.19	-51.10	1.98	-24.20	9.1	16.0	129.7	22.8	58

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	10	29	.0	2446367.5	5 32.644	+21 34.57	5 34.794	+21 36.07	1.16	-50.58	1.96	-24.26	9.0	15.9	131.4	22.5	46
1985	10	30	.0	2446368.5	5 29.409	+21 39.16	5 31.561	+21 40.82	1.13	-50.01	1.95	-24.31	9.0	15.8	133.1	21.8	33
1985	10	31	.0	2446369.5	5 25.960	+21 43.71	5 28.113	+21 45.55	1.10	-49.40	1.93	-24.37	8.9	15.7	134.9	21.3	21
1985	11	1	.0	2446370.5	5 22.281	+21 48.18	5 24.435	+21 50.22	1.07	-48.73	1.92	-24.42	8.8	15.7	136.8	20.7	9
1985	11	2	.0	2446371.5	5 18.358	+21 52.55	5 20.513	+21 54.78	1.05	-48.02	1.91	-24.48	8.7	15.6	138.7	20.1	6
1985	11	3	.0	2446372.5	5 14.175	+21 56.73	5 16.331	+21 59.18	1.02	-47.24	1.89	-24.54	8.6	15.5	140.6	19.4	18
1985	11	4	.0	2446373.5	5 9.717	+22 .69	5 11.874	+22 3.36	.99	-46.40	1.88	-24.59	8.5	15.4	142.7	18.7	31
1985	11	5	.0	2446374.5	5 4.968	+22 4.33	5 7.124	+22 7.25	.96	-45.50	1.86	-24.65	8.4	15.4	144.7	17.9	44
1985	11	6	.0	2446375.5	4 59.509	+22 7.57	5 2.065	+22 10.74	.94	-44.52	1.85	-24.70	8.3	15.3	146.9	17.0	58
1985	11	7	.0	2446376.5	4 54.523	+22 10.30	4 56.679	+22 13.75	.91	-43.46	1.84	-24.76	8.2	15.2	149.2	16.1	72
1985	11	8	.0	2446377.5	4 48.793	+22 12.41	4 50.948	+22 16.15	.89	-42.32	1.82	-24.82	8.1	15.1	151.5	15.1	87
1985	11	9	.0	2446378.5	4 42.702	+22 13.77	4 44.854	+22 17.80	.86	-41.09	1.81	-24.87	8.0	15.1	153.9	14.0	103
1985	11	10	.0	2446379.5	4 36.232	+22 14.20	4 38.382	+22 19.56	.84	-39.76	1.79	-24.93	7.9	15.0	156.[illegible]	12.8	119
1985	11	11	.0	2446380.5	4 29.369	+22 13.56	4 31.516	+22 18.25	.82	-38.33	1.78	-24.99	7.8	14.9	158.9	11.5	135
1985	11	12	.0	2446381.5	4 22.098	+22 11.63	4 24.241	+22 16.67	.80	-36.79	1.76	-25.04	7.7	14.8	161.6	10.2	152
1985	11	13	.0	2446382.5	4 14.410	+22 8.21	4 16.547	+22 13.62	.78	-35.13	1.75	-25.10	7.6	14.8	164.4	8.8	169
1985	11	14	.0	2446383.5	4 6.295	+22 3.08	4 8.426	+22 8.86	.76	-33.36	1.73	-25.16	7.5	14.7	167.2	7.3	173
1985	11	15	.0	2446384.5	3 57.750	+21 55.99	3 59.875	+22 2.16	.74	-31.47	1.72	-25.21	7.4	14.6	170.1	5.7	156
1985	11	16	.0	2446385.5	3 48.778	+21 46.68	3 50.895	+21 53.26	.72	-29.45	1.71	-25.27	7.3	14.5	173.1	4.0	139
1985	11	17	.0	2446386.5	3 39.387	+21 34.93	3 41.493	+21 41.91	.70	-27.30	1.69	-25.33	7.2	14.5	176.0	2.4	123
1985	11	18	.0	2446387.5	3 29.590	+21 20.46	3 31.686	+21 27.86	.69	-25.03	1.68	-25.38	7.1	14.4	177.7	1.4	107
1985	11	19	.0	2446388.5	3 19.411	+21 3.08	3 21.495	+21 10.89	.67	-22.64	1.66	-25.44	7.1	14.3	175.9	2.4	92
1985	11	20	.0	2446389.5	3 8.881	+20 42.57	3 10.952	+20 50.80	.66	-20.13	1.65	-25.50	7.0	14.3	172.8	4.3	76
1985	11	21	.0	2446390.5	2 58.040	+20 18.80	3 .096	+20 27.44	.65	-17.52	1.63	-25.55	6.9	14.2	169.3	6.4	61
1985	11	22	.0	2446391.5	2 46.935	+19 51.67	2 48.975	+20 .71	.64	-14.81	1.62	-25.61	6.8	14.2	165.7	8.7	47
1985	11	23	.0	2446392.5	2 35.621	+19 21.16	2 37.645	+19 30.59	.63	-12.03	1.60	-25.67	6.8	14.1	162.0	11.0	32
1985	11	24	.0	2446393.5	2 24.161	+18 47.34	2 26.168	+18 57.13	.63	-9.19	1.59	-25.72	6.7	14.1	158.3	13.3	18
1985	11	25	.0	2446394.5	2 12.619	+18 10.35	2 14.609	+18 20.48	.62	-6.31	1.57	-25.78	6.6	14.1	154.5	15.7	5
1985	11	26	.0	2446395.5	2 1.065	+17 30.42	2 3.037	+17 40.86	.62	-3.43	1.56	-25.83	6.6	14.0	150.7	18.1	12
1985	11	27	.0	2446396.5	1 49.566	+16 47.86	1 51.522	+16 58.58	.62	-.55	1.54	-25.89	6.5	14.0	146.9	20.5	26
1985	11	28	.0	2446397.5	1 38.189	+16 3.02	1 40.129	+16 14.01	.62	2.29	1.53	-25.94	6.5	14.0	143.[illegible]	22.8	41
1985	11	29	.0	2446398.5	1 26.996	+15 16.35	1 28.920	+15 27.56	.62	5.07	1.51	-25.99	6.4	14.0	[illegible]	25.2	55
1985	11	30	.0	2446399.5	1 16.043	+14 28.29	1 17.953	+14 39.69	.63	7.77	1.50	-26.05	6.4	14.0	135.5	27.5	70
1985	12	1	.0	2446400.5	1 5.379	+13 39.29	1 7.275	+13 50.87	.63	10.37	1.48	-26.10	6.4	14.0	131.7	29.7	85
1985	12	2	.0	2446401.5	0 55.042	+12 49.83	0 56.926	+13 1.54	.64	12.85	1.47	-26.15	6.3	14.0	128.1	31.9	100
1985	12	3	.0	2446402.5	0 45.067	+12 .33	0 46.940	+12 12.14	.65	15.20	1.45	-26.20	6.3	14.0	124.5	34.0	115
1985	12	4	.0	2446403.5	0 35.476	+11 11.18	0 37.339	+11 23.07	.66	17.40	1.44	-26.25	6.3	14.0	121.0	36.0	130
1985	12	5	.0	2446404.5	0 26.284	+10 22.72	0 28.138	+10 34.68	.67	19.47	1.42	-26.30	6.3	14.0	117.6	37.9	145
1985	12	6	.0	2446405.5	0 17.500	+ 9 35.26	0 19.347	+ 9 47.25	.68	21.38	1.41	-26.34	6.3	14.0	114.3	39.7	159
1985	12	7	.0	2446406.5	0 9.127	+ 8 49.03	0 10.967	+ 9 1.04	.69	23.14	1.39	-26.39	6.3	14.0	111.1	41.3	169
1985	12	8	.0	2446407.5	0 1.161	+ 8 4.22	0 2.996	+ 8 16.23	.70	24.75	1.38	-26.43	6.2	14.0	108.0	42.9	162
1985	12	9	.0	2446408.5	23 53.595	+ 7 20.97	23 55.425	+ 7 32.97	.72	26.22	1.36	-26.48	6.2	14.1	105.0	44.3	147
1985	12	10	.0	2446409.5	23 46.417	+ 6 39.38	23 48.244	+ 6 51.36	.73	27.55	1.35	-26.52	6.2	14.1	102.1	45.7	131
1985	12	11	.0	2446410.5	23 39.614	+ 5 59.50	23 41.439	+ 6 11.45	.75	28.75	1.33	-26.56	6.2	14.1	99.2	46.9	114
1985	12	12	.0	2446411.5	23 33.172	+ 5 21.37	23 34.994	+ 5 33.27	.77	29.81	1.32	-26.59	6.2	14.1	96.5	48.1	97
1985	12	13	.0	2446412.5	23 27.072	+ 4 44.97	23 28.893	+ 4 56.83	.79	30.76	1.30	-26.63	6.2	14.1	93.9	49.1	81
1985	12	14	.0	2446413.5	23 21.298	+ 4 10.29	23 23.118	+ 4 22.09	.80	31.59	1.28	-26.66	6.2	14.2	91.3	50.0	65
1985	12	15	.0	2446414.5	23 15.832	+ 3 37.27	23 17.652	+ 3 49.02	.82	32.31	1.27	-26.69	6.2	14.2	88.8	50.8	50
1985	12	16	.0	2446415.5	23 10.656	+ 3 5.88	23 12.475	+ 3 17.57	.84	32.94	1.25	-26.72	6.2	14.2	86.4	51.6	35
1985	12	17	.0	2446416.5	23 5.752	+ 2 36.04	23 7.572	+ 2 47.67	.86	33.47	1.24	-26.74	6.2	14.2	84.1	52.2	[illegible]
1985	12	18	.0	2446417.5	23 1.104	+ 2 7.69	23 2.924	+ 2 19.25	.88	33.92	1.22	-26.76	6.2	14.3	81.8	52.8	[illegible]
1985	12	19	.0	2446418.5	22 56.695	+ 1 40.75	22 58.515	+ 1 52.25	.90	34.29	1.21	-26.78	6.1	14.3	79.6	53.3	[illegible]
1985	12	20	.0	2446419.5	22 52.509	+ 1 15.15	22 54.330	+ 1 26.58	.92	34.58	1.19	-26.79	6.1	14.3	77.5	53.[illegible]	[illegible]
1985	12	21	.0	2446420.5	22 48.532	+ 0 50.82	22 50.353	+ 1 2.18	.94	34.80	1.18	-26.80	6.1	14.3	75.4	54.0	36
1985	12	22	.0	2446421.5	22 44.748	+ 0 27.67	22 46.571	+ 0 38.96	.96	34.96	1.16	-26.81	6.1	14.3	73.4	54.3	48

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1985	12	23	.0	2446422.5	22 41.145	+ 0 5.63	22 42.969	+ 0 16.86	.98	35.06	1.15	-26.81	6.1	14.3	71.4	54.5	61
1985	12	24	.0	2446423.5	22 37.710	- 0 15.36	22 39.535	- 0 4.20	1.00	35.10	1.13	-26.80	6.1	14.4	69.5	54.6	73
1985	12	25	.0	2446424.5	22 34.431	- 0 35.37	22 36.257	- 0 24.28	1.02	35.09	1.11	-26.79	6.0	14.4	67.6	54.7	86
1985	12	26	.0	2446425.5	22 31.296	- 0 54.48	22 33.124	- 0 43.45	1.04	35.02	1.10	-26.77	6.0	14.4	65.7	54.7	98
1985	12	27	.0	2446426.5	22 28.296	- 1 12.74	22 30.125	- 1 1.77	1.06	34.91	1.08	-26.74	6.0	14.4	63.9	54.6	111
1985	12	28	.0	2446427.5	22 25.420	- 1 30.22	22 27.251	- 1 19.31	1.08	34.76	1.07	-26.71	6.0	14.4	62.1	54.5	124
1985	12	29	.0	2446428.5	22 22.660	- 1 46.96	22 24.492	- 1 36.12	1.10	34.56	1.05	-26.67	5.9	14.4	60.4	54.3	136
1985	12	30	.0	2446429.5	22 20.006	- 2 3.03	22 21.839	- 1 52.25	1.12	34.31	1.04	-26.62	5.9	14.4	58.7	54.1	149
1985	12	31	.0	2446430.5	22 17.450	- 2 18.48	22 19.285	- 2 7.75	1.14	34.03	1.02	-26.56	5.9	14.4	57.0	53.8	160
1986	1	1	.0	2446431.5	22 14.985	- 2 33.34	22 16.822	- 2 22.68	1.16	33.71	1.01	-26.49	5.8	14.4	55.3	53.4	167
1986	1	2	.0	2446432.5	22 12.603	- 2 47.69	22 14.442	- 2 37.08	1.18	33.35	.99	-26.41	5.8	14.4	53.7	53.0	162
1986	1	3	.0	2446433.5	22 10.299	- 3 1.54	22 12.138	- 2 50.99	1.20	32.96	.98	-26.32	5.7	14.4	52.0	52.6	150
1986	1	4	.0	2446434.5	22 8.064	- 3 14.95	22 9.905	- 3 4.46	1.22	32.52	.96	-26.22	5.7	14.4	50.4	52.1	137
1986	1	5	.0	2446435.5	22 5.894	- 3 27.96	22 7.737	- 3 17.52	1.24	32.05	.95	-26.10	5.7	14.4	48.9	51.5	123
1986	1	6	.0	2446436.5	22 3.783	- 3 40.60	22 5.627	- 3 30.22	1.25	31.55	.93	-25.96	5.6	14.4	47.3	50.9	108
1986	1	7	.0	2446437.5	22 1.726	- 3 52.90	22 3.571	- 3 42.58	1.27	31.01	.92	-25.81	5.6	14.4	45.7	50.3	94
1986	1	8	.0	2446438.5	21 59.716	- 4 4.92	22 1.564	- 3 54.65	1.29	30.43	.90	-25.64	5.5	14.4	44.2	49.5	79
1986	1	9	.0	2446439.5	21 57.750	- 4 16.66	21 59.599	- 4 6.45	1.31	29.81	.89	-25.46	5.5	14.4	42.7	48.8	64
1986	1	10	.0	2446440.5	21 55.823	- 4 28.18	21 57.674	- 4 18.02	1.32	29.16	.87	-25.25	5.4	14.4	41.2	48.0	49
1986	1	11	.0	2446441.5	21 53.930	- 4 39.50	21 55.783	- 4 29.39	1.34	28.47	.86	-25.02	5.4	14.4	39.7	47.1	35
1986	1	12	.0	2446442.5	21 52.068	- 4 50.64	21 53.923	- 4 40.58	1.36	27.75	.84	-24.76	5.3	14.4	38.2	46.2	22
1986	1	13	.0	2446443.5	21 50.232	- 5 1.64	21 52.088	- 4 51.64	1.37	26.99	.83	-24.48	5.3	14.4	36.7	45.2	12
1986	1	14	.0	2446444.5	21 48.419	- 5 12.53	21 50.277	- 5 2.58	1.39	26.19	.81	-24.17	5.2	14.4	35.2	44.1	15
1986	1	15	.0	2446445.5	21 46.624	- 5 23.34	21 48.484	- 5 13.44	1.40	25.35	.80	-23.83	5.1	14.4	33.7	43.0	25
1986	1	16	.0	2446446.5	21 44.846	- 5 34.08	21 46.707	- 5 24.23	1.42	24.48	.79	-23.46	5.1	14.3	32.3	41.9	37
1986	1	17	.0	2446447.5	21 43.080	- 5 44.78	21 44.943	- 5 34.99	1.43	23.56	.77	-23.06	5.0	14.3	30.8	40.7	50
1986	1	18	.0	2446448.5	21 41.323	- 5 55.47	21 43.188	- 5 45.74	1.44	22.60	.76	-22.62	4.9	14.3	29.4	39.4	62
1986	1	19	.0	2446449.5	21 39.574	- 6 6.18	21 41.440	- 5 56.50	1.46	21.60	.75	-22.14	4.9	14.3	27.9	38.1	74
1986	1	20	.0	2446450.5	21 37.828	- 6 16.92	21 39.697	- 6 7.29	1.47	20.56	.73	-21.62	4.8	14.3	26.5	36.7	86
1986	1	21	.0	2446451.5	21 36.085	- 6 27.72	21 37.956	- 6 18.14	1.48	19.47	.72	-21.05	4.8	14.2	25.1	35.3	98
1986	1	22	.0	2446452.5	21 34.342	- 6 38.59	21 36.214	- 6 29.07	1.49	18.34	.71	-20.44	4.7	14.2	23.6	33.8	110
1986	1	23	.0	2446453.5	21 32.596	- 6 49.57	21 34.471	- 6 40.10	1.50	17.17	.70	-19.78	4.6	14.2	22.2	32.2	122
1986	1	24	.0	2446454.5	21 30.847	- 7 .66	21 32.724	- 6 51.25	1.51	15.94	.69	-19.07	4.6	14.2	20.8	30.6	134
1986	1	25	.0	2446455.5	21 29.092	- 7 11.89	21 30.972	- 7 2.54	1.52	14.67	.68	-18.31	4.5	14.2	19.4	28.9	147
1986	1	26	.0	2446456.5	21 27.331	- 7 23.27	21 29.213	- 7 13.98	1.53	13.35	.67	-17.49	4.4	14.1	18.0	27.2	158
1986	1	27	.0	2446457.5	21 25.562	- 7 34.83	21 27.446	- 7 25.59	1.54	11.99	.66	-16.61	4.4	14.1	16.7	25.5	167
1986	1	28	.0	2446458.5	21 23.784	- 7 46.57	21 25.671	- 7 37.40	1.54	10.57	.65	-15.68	4.3	14.1	15.3	23.7	164
1986	1	29	.0	2446459.5	21 21.998	- 7 58.51	21 23.887	- 7 49.40	1.55	9.11	.64	-14.70	4.3	14.1	14.0	21.9	153
1986	1	30	.0	2446460.5	21 20.203	- 8 10.67	21 22.094	- 8 1.62	1.55	7.61	.63	-13.65	4.2	14.1	12.7	20.0	140
1986	1	31	.0	2446461.5	21 18.398	- 8 23.05	21 20.292	- 8 14.06	1.56	6.06	.62	-12.55	4.1	14.0	11.4	18.2	127
1986	2	1	.0	2446462.5	21 16.585	- 8 35.66	21 18.482	- 8 26.74	1.56	4.47	.62	-11.39	4.1	14.0	10.2	16.5	113
1986	2	2	.0	2446463.5	21 14.763	- 8 48.52	21 16.663	- 8 39.66	1.56	2.84	.61	-10.18	4.1	14.0	9.1	14.8	99
1986	2	3	.0	2446464.5	21 12.934	- 9 1.64	21 14.837	- 8 52.83	1.56	1.18	.60	-8.93	4.0	14.0	8.1	13.3	84
1986	2	4	.0	2446465.5	21 11.099	- 9 15.00	21 13.004	- 9 6.27	1.56	-.52	.60	-7.62	4.0	14.0	7.3	12.1	70
1986	2	5	.0	2446466.5	21 9.258	- 9 28.63	21 11.167	- 9 19.96	1.56	-2.24	.60	-6.28	3.9	13.9	6.8	11.2	55
1986	2	6	.0	2446467.5	21 7.413	- 9 42.52	21 9.326	- 9 33.92	1.56	-3.98	.59	-4.91	3.9	13.9	6.5	10.9	41
1986	2	7	.0	2446468.5	21 5.566	- 9 56.68	21 7.482	- 9 48.14	1.56	-5.73	.59	-3.50	3.9	13.9	6.6	11.1	27
1986	2	8	.0	2446469.5	21 3.718	-10 11.11	21 5.638	-10 2.63	1.55	-7.48	.59	-2.08	3.9	13.9	7.0	11.8	15
1986	2	9	.0	2446470.5	21 1.872	-10 25.80	21 3.794	-10 17.39	1.55	-9.24	.59	-.65	4.1	13.9	7.7	13.1	11
1986	2	10	.0	2446471.5	21 .028	-10 40.75	21 1.954	-10 32.42	1.54	-10.99	.59	.79	4.1	13.9	8.6	14.6	20
1986	2	11	.0	2446472.5	20 58.188	-10 55.97	21 .118	-10 47.71	1.54	-12.72	.59	2.22	4.1	13.9	9.7	16.4	32
1986	2	12	.0	2446473.5	20 56.354	-11 11.46	20 58.288	-11 3.26	1.53	-14.43	.59	3.64	4.1	13.9	10.9	18.4	45
1986	2	13	.0	2446474.5	20 54.528	-11 27.20	20 56.466	-11 19.07	1.52	-16.12	.59	5.04	4.1	13.9	12.1	20.5	58
1986	2	14	.0	2446475.5	20 52.713	-11 43.21	20 54.652	-11 35.15	1.51	-17.77	.60	6.41	4.1	13.9	13.4	22.6	70
1986	2	15	.0	2446476.5	20 50.904	-11 59.47	20 52.849	-11 51.48	1.50	-19.38	.60	7.75	4.1	13.9	14.7	24.8	83
1986	2	16	.0	2446477.5	20 49.107	-12 16.00	20 51.056	-12 8.08	1.49	-20.95	.60	9.05	4.1	13.9	16.1	26.9	95

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	2	17	.0	2446478.5	20 47.322	-12 32.80	20 49.275	-12 24.94	1.48	-22.46	.61	10.30	4.1	13.9	17.5	29.1	107
1986	2	18	.0	2446479.5	20 45.548	-12 49.86	20 47.506	-12 42.08	1.46	-23.93	.62	11.51	4.2	13.9	18.9	31.2	119
1986	2	19	.0	2446480.5	20 43.786	-13 7.21	20 45.748	-12 59.49	1.45	-25.35	.62	12.66	4.2	13.9	20.3	33.3	132
1986	2	20	.0	2446481.5	20 42.035	-13 24.83	20 44.002	-13 17.18	1.43	-26.70	.63	13.75	4.2	13.9	21.7	35.4	144
1986	2	21	.0	2446482.5	20 40.294	-13 42.76	20 42.266	-13 35.17	1.42	-28.01	.64	14.79	4.2	13.9	23.1	37.4	156
1986	2	22	.0	2446483.5	20 38.562	-14 .99	20 40.539	-13 53.48	1.40	-29.25	.65	15.78	4.2	13.9	24.6	39.4	167
1986	2	23	.0	2446484.5	20 36.838	-14 19.55	20 38.819	-14 12.10	1.38	-30.44	.66	16.70	4.2	13.9	26.0	41.3	169
1986	2	24	.0	2446485.5	20 35.118	-14 38.46	20 37.106	-14 31.08	1.37	-31.57	.67	17.57	4.3	13.9	27.4	43.1	159
1986	2	25	.0	2446486.5	20 33.404	-14 57.73	20 35.396	-14 50.42	1.35	-32.65	.68	18.38	4.3	13.9	28.9	44.9	146
1986	2	26	.0	2446487.5	20 31.690	-15 17.40	20 33.687	-15 10.16	1.33	-33.67	.69	19.14	4.3	13.9	30.3	46.6	132
1986	2	27	.0	2446488.5	20 29.974	-15 37.49	20 31.976	-15 30.32	1.31	-34.64	.70	19.85	4.3	13.9	31.8	48.2	118
1986	2	28	.0	2446489.5	20 28.252	-15 58.03	20 30.259	-15 50.93	1.29	-35.56	.71	20.58	4.4	13.9	33.3	49.8	103
1986	3	1	.0	2446490.5	20 26.520	-16 19.06	20 28.534	-16 12.03	1.27	-36.42	.72	21.11	4.4	13.9	34.7	51.3	88
1986	3	2	.0	2446491.5	20 24.775	-16 40.63	20 26.794	-16 33.67	1.25	-37.24	.74	21.67	4.4	13.9	36.2	52.7	74
1986	3	3	.0	2446492.5	20 23.012	-17 2.76	20 25.037	-16 55.87	1.22	-38.01	.75	22.19	4.4	13.9	37.7	54.1	59
1986	3	4	.0	2446493.5	20 21.225	-17 25.57	20 23.257	-17 18.70	1.20	-38.73	.76	22.66	4.4	13.9	39.2	55.3	45
1986	3	5	.0	2446494.5	20 19.408	-17 48.95	20 21.447	-17 42.21	1.18	-39.40	.77	23.10	4.4	13.9	40.7	56.6	31
1986	3	6	.0	2446495.5	20 17.556	-18 13.12	20 19.602	-18 6.45	1.16	-40.03	.79	23.50	4.5	13.9	42.2	57.7	17
1986	3	7	.0	2446496.5	20 15.662	-18 38.08	20 17.714	-18 31.49	1.13	-40.62	.80	23.87	4.5	13.9	43.7	58.8	6
1986	3	8	.0	2446497.5	20 13.717	-19 3.90	20 15.777	-18 57.40	1.11	-41.16	.82	24.20	4.5	13.9	45.3	59.8	13
1986	3	9	.0	2446498.5	20 11.713	-19 30.66	20 13.781	-19 24.25	1.09	-41.65	.83	24.51	4.5	13.9	46.8	60.7	27
1986	3	10	.0	2446499.5	20 9.642	-19 58.45	20 11.718	-19 52.12	1.06	-42.10	.84	24.79	4.5	13.9	48.4	61.6	40
1986	3	11	.0	2446500.5	20 7.493	-20 27.34	20 9.578	-20 21.10	1.04	-42.51	.86	25.04	4.5	13.8	50.0	62.4	54
1986	3	12	.0	2446501.5	20 5.259	-20 57.44	20 7.348	-20 51.30	1.01	-42.87	.87	25.27	4.5	13.8	51.6	63.1	67
1986	3	13	.0	2446502.5	20 2.916	-21 28.84	20 5.018	-21 22.80	.99	-43.18	.89	25.47	4.5	13.8	53.2	63.8	80
1986	3	14	.0	2446503.5	20 .461	-22 1.67	20 2.573	-21 55.74	.96	-43.44	.90	25.66	4.5	13.8	54.9	64.3	93
1986	3	15	.0	2446504.5	19 57.875	-22 36.05	19 59.997	-22 30.23	.94	-43.65	.92	25.83	4.5	13.8	56.6	64.8	105
1986	3	16	.0	2446505.5	19 55.140	-23 12.10	19 57.274	-23 6.40	.91	-43.81	.93	25.98	4.5	13.7	58.4	65.3	118
1986	3	17	.0	2446506.5	19 52.237	-23 49.97	19 54.384	-23 44.40	.89	-43.92	.95	26.11	4.5	13.7	60.1	65.6	131
1986	3	18	.0	2446507.5	19 49.144	-24 29.81	19 51.303	-24 24.38	.86	-43.97	.96	26.23	4.5	13.7	62.0	65.9	143
1986	3	19	.0	2446508.5	19 45.836	-25 11.79	19 48.009	-25 6.50	.84	-43.95	.98	26.33	4.5	13.7	63.8	66.1	156
1986	3	20	.0	2446509.5	19 42.282	-25 56.08	19 44.470	-25 50.96	.81	-43.87	.99	26.42	4.5	13.6	65.8	66.1	169
1986	3	21	.0	2446510.5	19 38.451	-26 42.86	19 40.655	-26 37.92	.79	-43.71	1.01	26.50	4.4	13.6	67.8	66.1	176
1986	3	22	.0	2446511.5	19 34.305	-27 32.33	19 36.526	-27 27.58	.76	-43.47	1.02	26.57	4.4	13.6	69.8	66.0	163
1986	3	23	.0	2446512.5	19 29.798	-28 24.68	19 32.038	-28 20.14	.73	-43.14	1.04	26.63	4.4	13.5	71.9	65.8	149
1986	3	24	.0	2446513.5	19 24.882	-29 20.11	19 27.142	-29 15.80	.71	-42.72	1.05	26.68	4.4	13.5	74.1	65.5	134
1986	3	25	.0	2446514.5	19 19.495	-30 18.79	19 21.777	-30 14.74	.69	-42.18	1.07	26.72	4.3	13.4	76.5	65.0	119
1986	3	26	.0	2446515.5	19 13.571	-31 20.90	19 15.876	-31 17.14	.66	-41.52	1.09	26.75	4.3	13.4	78.9	64.4	103
1986	3	27	.0	2446516.5	19 7.028	-32 26.57	19 9.359	-32 23.12	.64	-40.73	1.10	26.77	4.3	13.3	81.4	63.7	87
1986	3	28	.0	2446517.5	18 59.774	-33 35.86	19 2.133	-33 32.77	.61	-39.78	1.12	26.79	4.2	13.3	84.0	62.8	71
1986	3	29	.0	2446518.5	18 51.700	-34 48.75	18 54.089	-34 46.06	.59	-38.66	1.13	26.80	4.2	13.2	86.8	61.8	55
1986	3	30	.0	2446519.5	18 42.681	-36 5.09	18 45.102	-36 2.85	.57	-37.33	1.15	26.81	4.2	13.2	89.7	60.5	39
1986	3	31	.0	2446520.5	18 32.573	-37 24.52	18 35.029	-37 22.80	.55	-35.79	1.16	26.81	4.1	13.1	92.7	59.1	23
1986	4	1	.0	2446521.5	18 21.216	-38 46.42	18 23.709	-38 45.29	.53	-34.01	1.18	26.80	4.1	13.1	96.0	57.5	11
1986	4	2	.0	2446522.5	18 8.434	-40 9.82	18 10.964	-40 9.35	.51	-31.95	1.19	26.79	4.1	13.0	99.4	55.7	16
1986	4	3	.0	2446523.5	17 54.041	-41 33.29	17 56.608	-41 33.57	.49	-29.59	1.21	26.78	4.0	13.0	102.9	53.7	30
1986	4	4	.0	2446524.5	17 37.859	-42 54.83	17 40.460	-42 55.96	.48	-26.92	1.22	26.76	4.0	12.9	106.7	51.5	46
1986	4	5	.0	2446525.5	17 19.738	-44 11.82	17 22.367	-44 13.89	.46	-23.90	1.24	26.74	4.0	12.9	110.6	49.1	61
1986	4	6	.0	2446526.5	16 59.592	-45 21.01	17 2.240	-45 24.11	.45	-20.55	1.26	26.72	4.0	12.8	114.7	46.4	77
1986	4	7	.0	2446527.5	16 37.445	-46 18.61	16 40.098	-46 22.83	.44	-16.87	1.27	26.69	3.9	12.8	118.8	43.6	93
1986	4	8	.0	2446528.5	16 13.490	-47 .62	16 16.119	-47 6.01	.43	-12.87	1.29	26.66	3.9	12.8	123.1	40.7	108
1986	4	9	.0	2446529.5	15 48.072	-47 23.32	15 50.676	-47 29.88	.42	-8.61	1.30	26.63	3.9	12.8	127.3	37.7	123
1986	4	10	.0	2446530.5	15 21.785	-47 23.82	15 24.332	-47 31.52	.42	-4.14	1.32	26.59	4.0	12.8	131.5	34.8	137
1986	4	11	.0	2446531.5	14 55.313	-47 .73	14 57.785	-47 9.47	.42	.45	1.33	26.55	4.0	12.8	135.5	31.8	147
1986	4	12	.0	2446532.5	14 29.382	-46 14.43	14 31.767	-46 24.08	.42	5.08	1.35	26.51	4.0	12.9	139.2	29.1	152
1986	4	13	.0	2446533.5	14 4.639	-45 7.06	14 6.931	-45 17.48	.42	9.65	1.36	26.47	4.1	12.9	142.4	26.7	148

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	4	14	.0	2446534.5	13 41.560	-43 42.13	13 43.765	-43 53.15	.43	14.08	1.38	26.43	4.2	13.0	145.2	24.6	137
1986	4	15	.0	2446535.5	13 20.433	-42 3.87	13 22.556	-42 15.33	.44	18.31	1.39	26.38	4.3	13.0	147.3	22.9	125
1986	4	16	.0	2446536.5	13 1.359	-40 16.62	13 3.412	-40 28.40	.45	22.27	1.41	26.34	4.4	13.1	148.7	21.7	111
1986	4	17	.0	2446537.5	12 44.308	-38 24.38	12 46.302	-38 36.38	.47	25.94	1.42	26.29	4.5	13.2	149.3	21.1	97
1986	4	18	.0	2446538.5	12 29.158	-36 30.52	12 31.105	-36 42.66	.48	29.29	1.44	26.24	4.6	13.3	149.3	20.9	83
1986	4	19	.0	2446539.5	12 15.744	-34 37.68	12 17.651	-34 49.90	.50	32.34	1.45	26.19	4.7	13.4	148.7	21.0	69
1986	4	20	.0	2446540.5	12 3.880	-32 47.80	12 5.757	-33 .05	.52	35.07	1.47	26.14	4.8	13.5	147.7	21.4	56
1986	4	21	.0	2446541.5	11 53.366	-31 2.20	11 55.239	-31 14.45	.54	37.53	1.48	26.09	4.9	13.6	146.4	22.0	43
1986	4	22	.0	2446542.5	11 44.091	-29 21.71	11 45.926	-29 33.93	.56	39.71	1.50	26.04	5.0	13.7	144.8	22.8	33
1986	4	23	.0	2446543.5	11 35.843	-27 46.77	11 37.664	-27 58.95	.59	41.66	1.51	25.99	5.2	13.8	143.0	23.5	29
1986	4	24	.0	2446544.5	11 28.508	-26 17.53	11 30.318	-26 29.67	.61	43.39	1.53	25.93	5.3	13.9	141.2	24.3	34
1986	4	25	.0	2446545.5	11 21.967	-24 53.98	11 23.770	-25 6.06	.64	44.94	1.54	25.88	5.4	14.1	139.3	25.1	44
1986	4	26	.0	2446546.5	11 16.121	-23 35.94	11 17.918	-23 47.97	.66	46.31	1.56	25.83	5.5	14.2	137.5	25.9	57
1986	4	27	.0	2446547.5	11 10.883	-22 23.17	11 12.676	-22 35.14	.69	47.52	1.57	25.77	5.6	14.3	135.6	26.6	72
1986	4	28	.0	2446548.5	11 6.178	-21 15.39	11 7.968	-21 27.30	.72	48.61	1.59	25.72	5.8	14.4	133.8	27.2	86
1986	4	29	.0	2446549.5	11 1.943	-20 12.27	11 3.731	-20 24.13	.74	49.58	1.60	25.66	5.9	14.5	132.0	27.8	100
1986	4	30	.0	2446550.5	10 58.123	-19 13.50	10 59.910	-19 25.30	.77	50.45	1.62	25.61	6.0	14.6	130.2	28.4	114
1986	5	1	.0	2446551.5	10 54.671	-18 18.77	10 56.457	-18 30.52	.80	51.22	1.63	25.55	6.1	14.7	128.6	28.9	127
1986	5	2	.0	2446552.5	10 51.546	-17 27.78	10 53.333	-17 39.48	.83	51.92	1.65	25.49	6.2	14.8	126.9	29.3	139
1986	5	3	.0	2446553.5	10 48.715	-16 40.24	10 50.502	-16 51.89	.86	52.54	1.66	25.44	6.3	14.9	125.2	29.7	148
1986	5	4	.0	2446554.5	10 46.145	-15 55.89	10 47.933	-16 7.49	.89	53.10	1.68	25.38	6.4	15.0	123.7	30.0	154
1986	5	5	.0	2446555.5	10 43.812	-15 14.48	10 45.600	-15 26.04	.92	53.60	1.69	25.32	6.5	15.1	122.1	30.3	153
1986	5	6	.0	2446556.5	10 41.691	-14 35.79	10 43.480	-14 47.31	.96	54.05	1.71	25.27	6.6	15.2	120.6	30.6	147
1986	5	7	.0	2446557.5	10 39.762	-13 59.61	10 41.552	-14 11.09	.99	54.45	1.72	25.21	6.7	15.3	119.2	30.8	138
1986	5	8	.0	2446558.5	10 38.008	-13 25.74	10 39.799	-13 37.19	1.02	54.81	1.74	25.15	6.8	15.3	117.8	31.0	127
1986	5	9	.0	2446559.5	10 36.413	-12 54.03	10 38.205	-13 5.44	1.05	55.13	1.75	25.10	6.9	15.4	116.4	31.1	116
1986	5	10	.0	2446560.5	10 34.962	-12 24.29	10 36.756	-12 35.67	1.08	55.41	1.76	25.04	7.0	15.5	115.0	31.2	105
1986	5	11	.0	2446561.5	10 33.644	-11 56.39	10 35.439	-12 7.75	1.11	55.66	1.78	24.98	7.1	15.6	113.7	31.3	94
1986	5	12	.0	2446562.5	10 32.447	-11 30.20	10 34.243	-11 41.53	1.15	55.89	1.79	24.92	7.2	15.7	112.4	31.4	82
1986	5	13	.0	2446563.5	10 31.361	-11 5.60	10 33.159	-11 16.90	1.18	56.09	1.81	24.87	7.3	15.7	111.1	31.4	71
1986	5	14	.0	2446564.5	10 30.378	-10 42.46	10 32.177	-10 53.75	1.21	56.26	1.82	24.81	7.4	15.8	109.9	31.4	60
1986	5	15	.0	2446565.5	10 29.490	-10 20.70	10 31.290	-10 31.97	1.24	56.41	1.84	24.76	7.4	15.9	108.7	31.4	49
1986	5	16	.0	2446566.5	10 28.688	-10 .22	10 30.490	-10 11.46	1.28	56.54	1.85	24.70	7.5	16.0	107.5	31.4	38
1986	5	17	.0	2446567.5	10 27.968	- 9 40.93	10 29.771	- 9 52.15	1.31	56.65	1.87	24.64	7.6	16.0	106.3	31.4	28
1986	5	18	.0	2446568.5	10 27.323	- 9 22.75	10 29.127	- 9 33.96	1.34	56.74	1.88	24.59	7.7	16.1	105.1	31.3	22
1986	5	19	.0	2446569.5	10 26.748	- 9 5.62	10 28.553	- 9 16.81	1.37	56.81	1.89	24.53	7.8	16.2	104.0	31.2	22
1986	5	20	.0	2446570.5	10 26.237	- 8 49.46	10 28.043	- 9 .64	1.41	56.87	1.91	24.48	7.8	16.2	102.9	31.1	29
1986	5	21	.0	2446571.5	10 25.787	- 8 34.22	10 27.594	- 8 45.39	1.44	56.91	1.92	24.42	7.9	16.3	101.8	31.0	40
1986	5	22	.0	2446572.5	10 25.393	- 8 19.84	10 27.201	- 8 31.00	1.47	56.94	1.94	24.36	8.0	16.4	100.7	30.9	53
1986	5	23	.0	2446573.5	10 25.053	- 8 6.26	10 26.861	- 8 17.41	1.51	56.95	1.95	24.31	8.1	16.4	99.6	30.8	67
1986	5	24	.0	2446574.5	10 24.761	- 7 53.45	10 26.571	- 8 4.59	1.54	56.96	1.96	24.25	8.1	16.5	98.6	30.7	81
1986	5	25	.0	2446575.5	10 24.[illegible]	- 7 41.35	10 26.327	- 7 52.49	1.57	56.95	1.98	24.20	8.2	16.6	97.5	30.5	96
1986	5	26	.0	2446576.5	10 24.314	- 7 29.93	10 26.126	- 7 41.06	1.60	56.93	1.99	24.15	8.3	16.6	96.5	30.3	110
1986	5	27	.0	2446577.5	10 24.154	- 7 19.15	10 25.966	- 7 30.27	1.64	56.90	2.01	24.09	8.3	16.7	95.5	30.2	124
1986	5	28	.0	2446578.5	10 24.032	- 7 8.97	10 25.845	- 7 20.09	1.67	56.87	2.02	24.04	8.4	16.7	94.5	30.0	137
1986	5	29	.0	2446579.5	10 23.946	- 6 59.36	10 25.760	- 7 10.48	1.70	56.82	2.03	23.98	8.5	16.8	93.5	29.8	149
1986	5	30	.0	2446580.5	10 23.895	- 6 50.29	10 25.710	- 7 1.41	1.74	56.76	2.05	23.93	8.5	16.9	92.5	29.6	157
1986	5	31	.0	2446581.5	10 23.876	- 6 41.74	10 25.692	- 6 52.85	1.77	56.69	2.06	23.88	8.6	16.9	91.5	29.5	160
1986	6	1	.0	2446582.5	10 23.889	- 6 33.66	10 25.705	- 6 44.79	1.80	56.62	2.08	23.82	8.7	17.0	90.5	29.3	155
1986	6	2	.0	2446583.5	10 23.930	- 6 26.08	10 25.747	- 6 37.19	1.83	56.53	2.09	23.77	8.7	17.0	89.6	29.0	146
1986	6	3	.0	2446584.5	10 24.000	- 6 18.93	10 25.817	- 6 30.04	1.87	56.44	2.10	23.72	8.8	17.1	88.6	28.8	136
1986	6	4	.0	2446585.5	10 24.096	- 6 12.20	10 25.913	- 6 23.31	1.90	56.34	2.12	23.67	8.8	17.1	87.7	28.6	125
1986	6	5	.0	2446586.5	10 24.216	- 6 5.87	10 26.034	- 6 16.98	1.93	56.22	2.13	23.62	8.9	17.2	86.7	28.4	114
1986	6	6	.0	2446587.5	10 24.361	- 5 59.93	10 26.179	- 6 11.04	1.96	56.11	2.14	23.56	8.9	17.2	85.8	28.2	103
1986	6	7	.0	2446588.5	10 24.529	- 5 54.35	10 26.347	- 6 5.46	2.00	55.98	2.16	23.51	9.0	17.3	84.9	27.9	92
1986	6	8	.0	2446589.5	10 24.717	- 5 49.12	10 26.536	- 6 .24	2.03	55.84	2.17	23.46	9.1	17.3	83.9	27.7	81

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	6	9	.0	2446590.5	10 24.926	- 5 44.24	10 26.746	- 5 55.36	2.06	55.70	2.18	23.41	9.1	17.4	83.0	27.5	69
1986	6	10	.0	2446591.5	10 25.154	- 5 39.67	10 26.975	- 5 50.79	2.09	55.55	2.20	23.36	9.2	17.4	82.1	27.2	58
1986	6	11	.0	2446592.5	10 25.401	- 5 35.41	10 27.222	- 5 46.54	2.13	55.39	2.21	23.31	9.2	17.5	81.2	27.0	47
1986	6	12	.0	2446593.5	10 25.666	- 5 31.45	10 27.497	- 5 42.58	2.16	55.23	2.22	23.26	9.3	17.5	80.3	26.7	36
1986	6	13	.0	2446594.5	10 25.947	- 5 27.77	10 27.769	- 5 38.91	2.19	55.06	2.24	23.21	9.3	17.6	79.4	26.5	26
1986	6	14	.0	2446595.5	10 26.245	- 5 24.36	10 28.066	- 5 35.50	2.22	54.88	2.25	23.16	9.4	17.6	78.6	26.2	19
1986	6	15	.0	2446596.5	10 26.557	- 5 21.22	10 28.379	- 5 32.36	2.25	54.69	2.26	23.11	9.4	17.6	77.7	26.0	18
1986	6	16	.0	2446597.5	10 26.884	- 5 18.32	10 28.706	- 5 29.47	2.28	54.50	2.28	23.06	9.5	17.7	76.8	25.7	25
1986	6	17	.0	2446598.5	10 27.225	- 5 15.67	10 29.047	- 5 26.82	2.32	54.31	2.29	23.02	9.5	17.7	76.0	25.5	35
1986	6	18	.0	2446599.5	10 27.579	- 5 13.24	10 29.401	- 5 24.40	2.35	54.10	2.30	22.97	9.6	17.8	75.1	25.2	48
1986	6	19	.0	2446600.5	10 27.946	- 5 11.04	10 29.768	- 5 22.21	2.38	53.90	2.32	22.92	9.6	17.8	74.2	25.0	61
1986	6	20	.0	2446601.5	10 28.325	- 5 9.05	10 30.147	- 5 20.23	2.41	53.68	2.33	22.87	9.7	17.8	73.4	24.7	75
1986	6	21	.0	2446602.5	10 28.715	- 5 7.27	10 30.538	- 5 18.46	2.44	53.46	2.34	22.82	9.7	17.9	72.5	24.4	90
1986	6	22	.0	2446603.5	10 29.116	- 5 5.69	10 30.939	- 5 16.88	2.47	53.24	2.36	22.78	9.8	17.9	71.7	24.2	104
1986	6	23	.0	2446604.5	10 29.527	- 5 4.30	10 31.351	- 5 15.50	2.50	53.01	2.37	22.73	9.8	18.0	70.8	23.9	118
1986	6	24	.0	2446605.5	10 29.949	- 5 3.10	10 31.773	- 5 14.30	2.53	52.78	2.38	22.68	9.9	18.0	70.0	23.6	132
1986	6	25	.0	2446606.5	10 30.381	- 5 2.07	10 32.205	- 5 13.28	2.56	52.55	2.40	22.64	9.9	18.0	69.2	23.3	145
1986	6	26	.0	2446607.5	10 30.821	- 5 1.21	10 32.645	- 5 12.43	2.59	52.30	2.41	22.59	9.9	18.1	68.3	23.1	156
1986	6	27	.0	2446608.5	10 31.271	- 5 .53	10 33.095	- 5 11.76	2.62	52.06	2.42	22.55	10.0	18.1	67.5	22.8	162
1986	6	28	.0	2446609.5	10 31.729	- 5 .00	10 33.553	- 5 11.24	2.65	51.80	2.44	22.50	10.0	18.2	66.7	22.5	160
1986	6	29	.0	2446610.5	10 32.196	- 4 59.63	10 34.020	- 5 10.88	2.68	51.55	2.45	22.45	10.1	18.2	65.8	22.3	151
1986	6	30	.0	2446611.5	10 32.670	- 4 59.42	10 34.494	- 5 10.67	2.71	51.28	2.46	22.41	10.1	18.2	65.0	22.0	141
1986	7	1	.0	2446612.5	10 33.152	- 4 59.35	10 34.976	- 5 10.61	2.74	51.02	2.47	22.36	10.2	18.3	64.2	21.7	130
1986	7	2	.0	2446613.5	10 33.641	- 4 59.43	10 35.466	- 5 10.70	2.77	50.74	2.49	22.32	10.2	18.3	63.4	21.4	119
1986	7	3	.0	2446614.5	10 34.138	- 4 59.64	10 35.962	- 5 10.92	2.80	50.46	2.50	22.28	10.2	18.3	62.6	21.2	108
1986	7	4	.0	2446615.5	10 34.641	- 4 59.99	10 36.465	- 5 11.28	2.83	50.18	2.51	22.23	10.3	18.4	61.8	20.9	97
1986	7	5	.0	2446616.5	10 35.150	- 5 .48	10 36.975	- 5 11.77	2.86	49.89	2.53	22.19	10.3	18.4	61.0	20.6	85
1986	7	6	.0	2446617.5	10 35.666	- 5 1.09	10 37.491	- 5 12.39	2.89	49.60	2.54	22.14	10.4	18.4	60.2	20.3	74
1986	7	7	.0	2446618.5	10 36.188	- 5 1.82	10 38.012	- 5 13.13	2.92	49.30	2.55	22.10	10.4	18.5	59.4	20.0	63
1986	7	8	.0	2446619.5	10 36.715	- 5 2.68	10 38.539	- 5 14.00	2.94	49.00	2.56	22.06	10.4	18.5	58.6	19.8	52
1986	7	9	.0	2446620.5	10 37.247	- 5 3.65	10 39.072	- 5 14.98	2.97	48.69	2.58	22.02	10.5	18.5	57.8	19.5	40
1986	7	10	.0	2446621.5	10 37.785	- 5 4.73	10 39.610	- 5 16.07	3.00	48.37	2.59	21.97	10.5	18.6	57.0	19.2	[illegible]
1986	7	11	.0	2446622.5	10 38.327	- 5 5.93	10 40.152	- 5 17.27	3.03	48.06	2.60	21.93	10.5	18.6	56.2	18.9	[illegible]
1986	7	12	.0	2446623.5	10 38.874	- 5 7.23	10 40.699	- 5 18.59	3.06	47.73	2.62	21.89	10.6	18.6	55.4	18.7	15
1986	7	13	.0	2446624.5	10 39.426	- 5 8.64	10 41.250	- 5 20.00	3.08	47.41	2.63	21.85	10.6	18.6	54.6	18.4	19
1986	7	14	.0	2446625.5	10 39.981	- 5 10.15	10 41.806	- 5 21.52	3.11	47.08	2.64	21.81	10.6	18.7	53.8	18.1	29
1986	7	15	.0	2446626.5	10 40.540	- 5 11.75	10 42.365	- 5 23.13	3.14	46.74	2.65	21.77	10.7	18.7	53.0	17.8	41
1986	7	16	.0	2446627.5	10 41.104	- 5 13.46	10 42.928	- 5 24.85	3.16	46.40	2.67	21.72	10.7	18.7	52.2	17.5	54
1986	7	17	.0	2446628.5	10 41.670	- 5 15.25	10 43.495	- 5 26.65	3.19	46.06	2.68	21.68	10.7	18.8	51.4	17.3	67
1986	7	18	.0	2446629.5	10 42.240	- 5 17.14	10 44.065	- 5 28.55	3.22	45.72	2.69	21.64	10.8	18.8	50.7	17.0	81
1986	7	19	.0	2446630.5	10 42.813	- 5 19.11	10 44.638	- 5 30.53	3.24	45.37	2.70	21.60	10.8	18.8	49.9	16.7	95
1986	7	20	.0	2446631.5	10 43.389	- 5 21.17	10 45.214	- 5 32.60	3.27	45.02	2.72	21.56	10.8	18.8	49.1	16.4	109
1986	7	21	.0	2446632.5	10 43.966	- 5 23.31	10 45.793	- 5 34.75	3.30	44.67	2.73	21.52	10.9	18.9	48.3	16.2	123
1986	7	22	.0	2446633.5	10 44.550	- 5 25.53	10 46.375	- 5 36.98	3.32	44.31	2.74	21.48	10.9	18.9	47.6	15.9	137
1986	7	23	.0	2446634.5	10 45.134	- 5 27.84	10 46.959	- 5 39.29	3.35	43.95	2.75	21.44	10.9	18.9	46.8	15.6	150
1986	7	24	.0	2446635.5	10 45.720	- 5 30.22	10 47.545	- 5 41.68	3.37	43.58	2.77	21.40	11.0	18.9	46.0	15.3	160
1986	7	25	.0	2446636.5	10 46.309	- 5 32.67	10 48.134	- 5 44.15	3.40	43.22	2.78	21.37	11.0	19.0	45.3	15.1	164
1986	7	26	.0	2446637.5	10 46.900	- 5 35.20	10 48.724	- 5 46.68	3.42	42.85	2.79	21.33	11.0	19.0	44.5	14.8	158
1986	7	27	.0	2446638.5	10 47.493	- 5 37.80	10 49.317	- 5 49.29	3.45	42.47	2.80	21.29	11.1	19.0	43.7	14.5	148
1986	7	28	.0	2446639.5	10 48.088	- 5 40.47	10 49.912	- 5 51.97	3.47	42.09	2.81	21.25	11.1	19.0	43.0	14.2	137
1986	7	29	.0	2446640.5	10 48.684	- 5 43.22	10 50.509	- 5 54.72	3.50	41.71	2.83	21.21	11.1	19.1	42.2	14.0	126
1986	7	30	.0	2446641.5	10 49.282	- 5 46.03	10 51.107	- 5 57.54	3.52	41.32	2.84	21.17	11.2	19.1	41.4	13.7	115
1986	7	31	.0	2446642.5	10 49.882	- 5 48.90	10 51.707	- 6 .43	3.54	40.93	2.85	21.14	11.2	19.1	40.7	13.4	104
1986	8	1	.0	2446643.5	10 50.483	- 5 51.84	10 52.308	- 6 3.38	3.57	40.54	2.86	21.10	11.2	19.1	39.9	13.1	92
1986	8	2	.0	2446644.5	10 51.086	- 5 54.85	10 52.910	- 6 6.39	3.59	40.14	2.88	21.06	11.2	19.2	39.2	12.9	81
1986	8	3	.0	2446645.5	10 51.689	- 5 57.91	10 53.514	- 6 9.47	3.61	39.74	2.89	21.03	11.3	19.2	38.4	12.6	70

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	8	4	.0	2446646.5	10 52.294	- 6 1.04	10 54.119	- 6 12.60	3.64	39.34	2.90	20.99	11.3	19.2	37.7	12.3	58
1986	8	5	.0	2446647.5	10 52.900	- 6 4.22	10 54.724	- 6 15.80	3.66	38.93	2.91	20.95	11.3	19.2	36.9	12.1	47
1986	8	6	.0	2446648.5	10 53.506	- 6 7.47	10 55.331	- 6 19.05	3.68	38.52	2.92	20.92	11.3	19.3	36.2	11.8	36
1986	8	7	.0	2446649.5	10 54.113	- 6 10.77	10 55.937	- 6 22.36	3.70	38.10	2.94	20.88	11.4	19.3	35.4	11.6	25
1986	8	8	.0	2446650.5	10 54.720	- 6 14.12	10 56.545	- 6 25.72	3.73	37.69	2.95	20.84	11.4	19.3	34.7	11.3	17
1986	8	9	.0	2446651.5	10 55.328	- 6 17.53	10 57.152	- 6 29.14	3.75	37.27	2.96	20.81	11.4	19.3	34.0	11.0	15
1986	8	10	.0	2446652.5	10 55.936	- 6 20.99	10 57.760	- 6 32.60	3.77	36.84	2.97	20.77	11.5	19.3	33.2	10.8	23
1986	8	11	.0	2446653.5	10 56.544	- 6 24.51	10 58.368	- 6 36.12	3.79	36.42	2.98	20.74	11.5	19.4	32.5	10.5	34
1986	8	12	.0	2446654.5	10 57.152	- 6 28.07	10 58.976	- 6 39.69	3.81	35.99	3.00	20.70	11.5	19.4	31.8	10.3	46
1986	8	13	.0	2446655.5	10 57.760	- 6 31.68	10 59.584	- 6 43.31	3.83	35.56	3.01	20.67	11.5	19.4	31.0	10.0	59
1986	8	14	.0	2446656.5	10 58.367	- 6 35.34	11 .192	- 6 46.98	3.85	35.13	3.02	20.63	11.6	19.4	30.3	9.7	73
1986	8	15	.0	2446657.5	10 58.974	- 6 39.04	11 .799	- 6 50.69	3.87	34.69	3.03	20.60	11.6	19.4	29.6	9.5	86
1986	8	16	.0	2446658.5	10 59.581	- 6 42.79	11 1.406	- 6 54.45	3.89	34.26	3.04	20.56	11.6	19.5	28.9	9.2	100
1986	8	17	.0	2446659.5	11 .187	- 6 46.58	11 2.012	- 6 58.25	3.91	33.82	3.06	20.53	11.6	19.5	28.2	9.0	114
1986	8	18	.0	2446660.5	11 .793	- 6 50.41	11 2.618	- 7 2.09	3.93	33.38	3.07	20.50	11.7	19.5	27.4	8.7	128
1986	8	19	.0	2446661.5	11 1.398	- 6 54.29	11 3.223	- 7 5.97	3.95	32.94	3.08	20.46	11.7	19.5	26.7	8.5	141
1986	8	20	.0	2446662.5	11 2.001	- 6 58.20	11 3.827	- 7 9.89	3.97	32.49	3.09	20.43	11.7	19.5	26.0	8.3	153
1986	8	21	.0	2446663.5	11 2.604	- 7 2.16	11 4.429	- 7 13.86	3.99	32.05	3.10	20.39	11.7	19.6	25.3	8.0	163
1986	8	22	.0	2446664.5	11 3.206	- 7 6.15	11 5.031	- 7 17.86	4.01	31.60	3.12	20.36	11.7	19.6	24.7	7.8	164
1986	8	23	.0	2446665.5	11 3.807	- 7 10.18	11 5.632	- 7 21.90	4.02	31.15	3.13	20.33	11.8	19.6	24.0	7.6	156
1986	8	24	.0	2446666.5	11 4.407	- 7 14.25	11 6.232	- 7 25.97	4.04	30.70	3.14	20.29	11.8	19.6	23.3	7.3	146
1986	8	25	.0	2446667.5	11 5.005	- 7 18.36	11 6.830	- 7 30.08	4.06	30.25	3.15	20.26	11.8	19.6	22.6	7.1	134
1986	8	26	.0	2446668.5	11 5.603	- 7 22.50	11 7.428	- 7 34.23	4.08	29.79	3.16	20.23	11.8	19.7	22.0	6.9	123
1986	8	27	.0	2446669.5	11 6.198	- 7 26.68	11 8.024	- 7 38.42	4.09	29.33	3.17	20.20	11.9	19.7	21.3	6.6	112
1986	8	28	.0	2446670.5	11 6.793	- 7 30.89	11 8.618	- 7 42.64	4.11	28.87	3.19	20.16	11.9	19.7	20.7	[illegible]	100
1986	8	29	.0	2446671.5	11 7.385	- 7 35.14	11 9.211	- 7 46.89	4.13	28.41	3.20	20.13	11.9	19.7	20.0	6.2	89
1986	8	30	.0	2446672.5	11 7.976	- 7 39.42	11 9.802	- 7 51.18	4.14	27.94	3.21	20.10	11.9	19.7	19.4	6.0	78
1986	8	31	.0	2446673.5	11 8.565	- 7 43.73	11 10.391	- 7 55.49	4.16	27.48	3.22	20.07	11.9	19.7	18.8	5.8	66
1986	9	1	.0	2446674.5	11 9.152	- 7 48.07	11 10.978	- 7 59.84	4.17	27.01	3.23	20.04	12.0	19.8	18.2	5.6	55
1986	9	2	.0	2446675.5	11 9.738	- 7 52.44	11 11.564	- 8 4.22	4.19	26.54	3.24	20.01	12.0	19.8	17.6	5.4	43
1986	9	3	.0	2446676.5	11 10.321	- 7 56.84	11 12.147	- 8 8.63	4.21	26.06	3.25	19.97	12.0	19.8	17.1	5.2	32
1986	9	4	.0	2446677.5	11 10.902	- 8 1.28	11 12.728	- 8 13.07	4.22	25.59	3.27	19.94	12.0	19.8	16.5	5.0	21
1986	9	5	.0	2446678.5	11 11.480	- 8 5.73	11 13.306	- 8 17.53	4.24	25.11	3.28	19.91	12.0	19.8	16.0	4.9	15
1986	9	6	.0	2446679.5	11 12.056	- 8 10.22	11 13.882	- 8 22.02	4.25	24.64	3.29	19.88	12.1	19.8	15.5	4.7	17
1986	9	7	.0	2446680.5	11 12.629	- 8 14.73	11 14.456	- 8 26.54	4.26	24.16	3.30	19.85	12.1	19.8	15.1	4.6	27
1986	9	8	.0	2446681.5	11 13.200	- 8 19.27	11 15.027	- 8 31.08	4.28	23.68	3.31	19.82	12.1	19.9	14.6	4.4	39
1986	9	9	.0	2446682.5	11 13.768	- 8 23.83	11 15.595	- 8 35.65	4.29	23.20	3.32	19.79	12.1	19.9	14.2	4.3	52
1986	9	10	.0	2446683.5	11 14.333	- 8 28.42	11 16.160	- 8 40.24	4.30	22.72	3.34	19.76	12.1	19.9	13.8	4.1	65
1986	9	11	.0	2446684.5	11 14.895	- 8 33.02	11 16.722	- 8 44.86	4.32	22.24	3.35	19.73	12.1	19.9	13.5	4.0	79
1986	9	12	.0	2446685.5	11 15.454	- 8 37.65	11 17.281	- 8 49.49	4.33	21.76	3.36	19.70	12.2	19.9	13.2	3.9	92
1986	9	13	.0	2446686.5	11 16.010	- 8 42.30	11 17.837	- 8 54.15	4.34	21.28	3.37	19.67	12.2	19.9	13.0	3.8	106
1986	9	14	.0	2446687.5	11 16.562	- 8 46.97	11 18.390	- 8 58.82	4.35	20.80	3.38	19.64	12.2	19.9	12.8	3.8	119
1986	9	15	.0	2446688.5	11 17.111	- 8 51.66	11 18.939	- 9 3.52	4.37	20.32	3.39	19.61	12.2	20.0	12.6	3.7	132
1986	9	16	.0	2446689.5	11 17.656	- 8 56.37	11 19.485	- 9 8.23	4.38	19.84	3.40	19.58	12.2	20.0	12.5	3.7	145
1986	9	17	.0	2446690.5	11 18.198	- 9 1.10	11 20.027	- 9 12.96	4.39	19.36	3.41	19.55	12.2	20.0	12.4	3.6	156
1986	9	18	.0	2446691.5	11 18.736	- 9 5.84	11 20.565	- 9 17.71	4.40	18.87	3.43	19.52	12.3	20.0	12.4	3.6	164
1986	9	19	.0	2446692.5	11 19.271	- 9 10.60	11 21.100	- 9 22.48	4.41	18.39	3.44	19.50	12.3	20.0	12.5	3.6	163
1986	9	20	.0	2446693.5	11 19.801	- 9 15.38	11 21.630	- 9 27.26	4.42	17.91	3.45	19.47	12.3	20.0	12.6	3.6	154
1986	9	21	.0	2446694.5	11 20.328	- 9 20.18	11 22.157	- 9 32.06	4.43	17.43	3.46	19.44	12.3	20.0	12.8	3.7	143
1986	9	22	.0	2446695.5	11 20.851	- 9 24.98	11 22.680	- 9 36.87	4.44	16.95	3.47	19.41	12.3	20.0	13.0	3.7	131
1986	9	23	.0	2446696.5	11 21.369	- 9 29.81	11 23.199	- 9 41.70	4.45	16.47	3.48	19.38	12.3	20.1	13.2	3.8	120
1986	9	24	.0	2446697.5	11 21.883	- 9 34.65	11 23.713	- 9 46.54	4.46	15.98	3.49	19.35	12.4	20.1	13.5	3.9	109
1986	9	25	.0	2446698.5	11 22.393	- 9 39.50	11 24.224	- 9 51.40	4.47	15.50	3.50	19.33	12.4	20.1	13.9	3.9	97
1986	9	26	.0	2446699.5	11 22.895	- 9 44.36	11 24.730	- 9 56.27	4.48	15.02	3.52	19.30	12.4	20.1	14.3	4.0	86
1986	9	27	.0	2446700.5	11 23.400	- 9 49.24	11 25.231	-10 1.15	4.49	14.53	3.53	19.27	12.4	20.1	14.7	4.1	75
1986	9	28	.0	2446701.5	11 23.896	- 9 54.13	11 25.728	-10 6.04	4.50	14.05	3.54	19.24	12.4	20.1	15.2	4.2	63

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	9	29	.0	2446702.5	11 24.388	- 9 59.03	11 26.220	-10 10.95	4.50	13.56	3.55	19.21	12.4	20.1	15.6	4.4	52
1986	9	30	.0	2446703.5	11 24.875	-10 3.94	11 26.707	-10 15.86	4.51	13.08	3.56	19.19	12.4	20.1	16.2	4.5	40
1986	10	1	.0	2446704.5	11 25.356	-10 8.86	11 27.189	-10 20.79	4.52	12.60	3.57	19.16	12.5	20.1	16.7	4.6	29
1986	10	2	.0	2446705.5	11 25.833	-10 13.79	11 27.665	-10 25.72	4.53	12.12	3.58	19.13	12.5	20.1	17.3	4.8	19
1986	10	3	.0	2446706.5	11 26.304	-10 18.72	11 28.137	-10 30.66	4.53	11.63	3.59	19.11	12.5	20.2	17.9	4.9	14
1986	10	4	.0	2446707.5	11 26.770	-10 23.67	11 28.603	-10 35.61	4.54	11.15	3.60	19.08	12.5	20.2	18.5	5.0	20
1986	10	5	.0	2446708.5	11 27.230	-10 28.62	11 29.064	-10 40.56	4.55	10.67	3.62	19.05	12.5	20.2	19.1	5.2	31
1986	10	6	.0	2446709.5	11 27.685	-10 33.57	11 29.519	-10 45.52	4.55	10.20	3.63	19.03	12.5	20.2	19.8	5.3	44
1986	10	7	.0	2446710.5	11 28.134	-10 38.53	11 29.968	-10 50.48	4.56	9.72	3.64	19.00	12.5	20.2	20.4	5.5	58
1986	10	8	.0	2446711.5	11 28.577	-10 43.50	11 30.411	-10 55.45	4.56	9.24	3.65	18.97	12.6	20.2	21.1	5.7	71
1986	10	9	.0	2446712.5	11 29.014	-10 48.46	11 30.848	-11 .42	4.57	8.77	3.66	18.95	12.6	20.2	21.8	5.8	85
1986	10	10	.0	2446713.5	11 29.444	-10 53.43	11 31.279	-11 5.40	4.57	8.30	3.67	18.92	12.6	20.2	22.5	6.0	99
1986	10	11	.0	2446714.5	11 29.868	-10 58.40	11 31.704	-11 10.37	4.58	7.83	3.68	18.89	12.6	20.2	23.2	6.1	112
1986	10	12	.0	2446715.5	11 30.286	-11 3.38	11 32.122	-11 15.35	4.58	7.37	3.69	18.87	12.6	20.2	23.9	6.3	125
1986	10	13	.0	2446716.5	11 30.697	-11 8.35	11 32.534	-11 20.32	4.59	6.91	3.70	18.84	12.6	20.2	24.7	6.5	138
1986	10	14	.0	2446717.5	11 31.102	-11 13.32	11 32.939	-11 25.29	4.59	6.45	3.71	18.82	12.6	20.3	25.4	6.6	150
1986	10	15	.0	2446718.5	11 31.500	-11 18.28	11 33.337	-11 30.26	4.59	5.99	3.72	18.79	12.6	20.3	26.2	6.8	160
1986	10	16	.0	2446719.5	11 31.891	-11 23.25	11 33.728	-11 35.23	4.60	5.53	3.74	18.77	12.6	20.3	26.9	6.9	164
1986	10	17	.0	2446720.5	11 32.274	-11 28.21	11 34.112	-11 40.20	4.60	5.08	3.75	18.74	12.7	20.3	27.7	7.1	159
1986	10	18	.0	2446721.5	11 32.651	-11 33.17	11 34.489	-11 45.16	4.60	4.63	3.76	18.72	12.7	20.3	28.5	7.3	150
1986	10	19	.0	2446722.5	11 33.021	-11 38.13	11 34.859	-11 50.12	4.61	4.18	3.77	18.69	12.7	20.3	29.3	7.4	139
1986	10	20	.0	2446723.5	11 33.383	-11 43.08	11 35.221	-11 55.07	4.61	3.73	3.78	18.67	12.7	20.3	30.1	7.6	127
1986	10	21	.0	2446724.5	11 33.737	-11 48.03	11 35.576	-12 .02	4.61	3.29	3.79	18.64	12.7	20.3	30.9	7.7	116
1986	10	22	.0	2446725.5	11 34.084	-11 52.96	11 35.924	-12 4.97	4.61	2.84	3.80	18.62	12.7	20.3	31.7	7.9	105
1986	10	23	.0	2446726.5	11 34.423	-11 57.90	11 36.263	-12 9.90	4.61	2.40	3.81	18.59	12.7	20.3	32.5	8.1	93
1986	10	24	.0	2446727.5	11 34.754	-12 2.82	11 36.595	-12 14.83	4.61	1.97	3.82	18.57	12.7	20.3	33.3	8.2	82
1986	10	25	.0	2446728.5	11 35.077	-12 7.74	11 36.919	-12 19.75	4.61	1.53	3.83	18.54	12.7	20.3	34.1	8.4	71
1986	10	26	.0	2446729.5	11 35.392	-12 12.65	11 37.234	-12 24.66	4.62	1.10	3.84	18.52	12.8	20.3	34.9	8.5	59
1986	10	27	.0	2446730.5	11 35.699	-12 17.54	11 37.541	-12 29.56	4.62	.67	3.85	18.49	12.8	20.4	35.8	8.7	48
1986	10	28	.0	2446731.5	11 35.997	-12 22.43	11 37.839	-12 34.45	4.62	.24	3.86	18.47	12.8	20.4	36.6	8.8	37
1986	10	29	.0	2446732.5	11 36.286	-12 27.30	11 38.129	-12 39.32	4.62	-.18	3.88	18.45	12.8	20.4	37.4	9.0	26
1986	10	30	.0	2446733.5	11 36.566	-12 32.16	11 38.410	-12 44.19	4.62	-.60	3.89	18.42	12.8	20.4	38.3	9.1	17
1986	10	31	.0	2446734.5	11 36.838	-12 37.01	11 38.681	-12 49.04	4.62	-1.01	3.90	18.40	12.8	20.4	39.1	9.3	16
1986	11	1	.0	2446735.5	11 37.100	-12 41.84	11 38.944	-12 53.87	4.62	-1.42	3.91	18.37	12.8	20.4	40.0	9.4	24
1986	11	2	.0	2446736.5	11 37.352	-12 46.66	11 39.197	-12 58.69	4.61	-1.83	3.92	18.35	12.8	20.4	40.8	9.5	36
1986	11	3	.0	2446737.5	11 37.596	-12 51.46	11 39.441	-13 3.49	4.61	-2.23	3.93	18.33	12.8	20.4	41.7	9.7	50
1986	11	4	.0	2446738.5	11 37.829	-12 56.24	11 39.675	-13 8.27	4.61	-2.63	3.94	18.30	12.8	20.4	42.6	9.8	64
1986	11	5	.0	2446739.5	11 38.053	-13 1.00	11 39.899	-13 13.04	4.61	-3.02	3.95	18.28	12.8	20.4	43.4	9.9	78
1986	11	6	.0	2446740.5	11 38.266	-13 5.74	11 40.113	-13 17.78	4.61	-3.41	3.96	18.26	12.8	20.4	44.3	10.1	92
1986	11	7	.0	2446741.5	11 38.470	-13 10.46	11 40.317	-13 22.50	4.61	-3.79	3.97	18.23	12.9	20.4	45.2	10.2	106
1986	11	8	.0	2446742.5	11 38.663	-13 15.15	11 40.510	-13 27.20	4.60	-4.16	3.98	18.21	12.9	20.4	46.1	10.3	119
1986	11	9	.0	2446743.5	11 38.845	-13 19.82	11 40.693	-13 31.88	4.60	-4.53	3.99	18.19	12.9	20.4	47.0	10.5	132
1986	11	10	.0	2446744.5	11 39.017	-13 24.47	11 40.866	-13 36.53	4.60	-4.90	4.00	18.17	12.9	20.4	47.9	10.6	144
1986	11	11	.0	2446745.5	11 39.178	-13 29.09	11 41.027	-13 41.15	4.60	-5.26	4.01	18.14	12.9	20.4	48.7	10.7	155
1986	11	12	.0	2446746.5	11 39.328	-13 33.69	11 41.177	-13 45.74	4.59	-5.61	4.02	18.12	12.9	20.4	49.6	10.8	162
1986	11	13	.0	2446747.5	11 39.467	-13 38.25	11 41.317	-13 50.31	4.59	-5.96	4.03	18.10	12.9	20.4	50.5	10.9	162
1986	11	14	.0	2446748.5	11 39.594	-13 42.79	11 41.445	-13 54.85	4.59	-6.30	4.04	18.08	12.9	20.4	51.5	11.0	154
1986	11	15	.0	2446749.5	11 39.711	-13 47.29	11 41.561	-13 59.36	4.58	-6.63	4.05	18.05	12.9	20.4	52.4	11.1	144
1986	11	16	.0	2446750.5	11 39.815	-13 51.77	11 41.667	-14 3.84	4.58	-6.96	4.06	18.03	12.9	20.4	53.3	11.2	133
1986	11	17	.0	2446751.5	11 39.908	-13 56.21	11 41.760	-14 8.28	4.57	-7.29	4.08	18.01	12.9	20.5	54.2	11.3	122
1986	11	18	.0	2446752.5	11 39.989	-14 .62	11 41.842	-14 12.70	4.57	-7.60	4.09	17.99	12.9	20.5	55.1	11.4	110
1986	11	19	.0	2446753.5	11 40.058	-14 5.00	11 41.911	-14 17.07	4.57	-7.92	4.10	17.97	12.9	20.5	56.0	11.5	99
1986	11	20	.0	2446754.5	11 40.115	-14 9.34	11 41.969	-14 21.42	4.56	-8.22	4.11	17.94	12.9	20.5	57.0	11.6	88
1986	11	21	.0	2446755.5	11 40.160	-14 13.64	11 42.013	-14 25.72	4.56	-8.52	4.12	17.92	13.0	20.5	57.9	11.7	76
1986	11	22	.0	2446756.5	11 40.192	-14 17.91	11 42.046	-14 29.99	4.55	-8.82	4.13	17.90	13.0	20.5	58.8	11.8	65
1986	11	23	.0	2446757.5	11 40.211	-14 22.13	11 42.065	-14 34.22	4.55	-9.10	4.14	17.88	13.0	20.5	59.8	11.9	54

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1986	11	24	.0	2446758.5	11 40.217	-14 26.32	11 42.072	-14 38.40	4.54	-9.38	4.15	17.86	13.0	20.5	60.7	12.0	43
1986	11	25	.0	2446759.5	11 40.210	-14 30.46	11 42.066	-14 42.55	4.53	-9.66	4.16	17.84	13.0	20.5	61.7	12.1	32
1986	11	26	.0	2446760.5	11 40.190	-14 34.56	11 42.046	-14 46.65	4.53	-9.92	4.17	17.81	13.0	20.5	62.6	12.1	22
1986	11	27	.0	2446761.5	11 40.156	-14 38.61	11 42.013	-14 50.70	4.52	-10.18	4.18	17.79	13.0	20.5	63.6	12.2	17
1986	11	28	.0	2446762.5	11 40.109	-14 42.62	11 41.966	-14 54.71	4.52	-10.43	4.19	17.77	13.0	20.5	64.5	12.3	20
1986	11	29	.0	2446763.5	11 40.048	-14 46.57	11 41.905	-14 58.67	4.51	-10.67	4.20	17.75	13.0	20.5	65.5	12.3	30
1986	11	30	.0	2446764.5	11 39.973	-14 50.48	11 41.830	-15 2.58	4.50	-10.91	4.21	17.73	13.0	20.5	66.5	12.4	42
1986	12	1	.0	2446765.5	11 39.884	-14 54.34	11 41.742	-15 6.44	4.50	-11.13	4.22	17.71	13.0	20.5	67.4	12.5	56
1986	12	2	.0	2446766.5	11 39.781	-14 58.14	11 41.639	-15 10.24	4.49	-11.35	4.23	17.69	13.0	20.5	68.4	12.5	70
1986	12	3	.0	2446767.5	11 39.662	-15 1.89	11 41.521	-15 13.99	4.49	-11.56	4.24	17.67	13.0	20.5	69.4	12.6	85
1986	12	4	.0	2446768.5	11 39.530	-15 5.57	11 41.389	-15 17.68	4.48	-11.76	4.25	17.65	13.0	20.5	70.4	12.6	99
1986	12	5	.0	2446769.5	11 39.382	-15 9.20	11 41.242	-15 21.32	4.47	-11.94	4.26	17.63	13.0	20.5	71.4	12.7	113
1986	12	6	.0	2446770.5	11 39.220	-15 12.77	11 41.080	-15 24.89	4.46	-12.12	4.27	17.61	13.0	20.5	72.3	12.7	127
1986	12	7	.0	2446771.5	11 39.042	-15 16.28	11 40.902	-15 28.40	4.46	-12.29	4.28	17.58	13.0	20.5	73.3	12.7	140
1986	12	8	.0	2446772.5	11 38.849	-15 19.72	11 40.710	-15 31.84	4.45	-12.45	4.29	17.56	13.0	20.5	74.3	12.8	151
1986	12	9	.0	2446773.5	11 38.641	-15 23.10	11 40.502	-15 35.22	4.44	-12.60	4.30	17.54	13.0	20.5	75.3	12.8	160
1986	12	10	.0	2446774.5	11 38.417	-15 26.41	11 40.278	-15 38.53	4.44	-12.74	4.31	17.52	13.0	20.5	76.3	12.8	161
1986	12	11	.0	2446775.5	11 38.178	-15 29.65	11 40.039	-15 41.77	4.43	-12.87	4.32	17.50	13.1	20.5	77.3	12.8	156
1986	12	12	.0	2446776.5	11 37.923	-15 32.82	11 39.784	-15 44.94	4.42	-12.99	4.33	17.48	13.1	20.5	78.4	12.9	146
1986	12	13	.0	2446777.5	11 37.652	-15 35.92	11 39.514	-15 48.04	4.41	-13.10	4.34	17.46	13.1	20.5	79.4	12.9	135
1986	12	14	.0	2446778.5	11 37.365	-15 38.94	11 39.227	-15 51.06	4.41	-13.20	4.35	17.44	13.1	20.5	80.4	12.9	124
1986	12	15	.0	2446779.5	11 37.063	-15 41.89	11 38.925	-15 54.01	4.40	-13.29	4.36	17.42	13.1	20.5	81.4	12.9	113
1986	12	16	.0	2446780.5	11 36.744	-15 44.75	11 38.606	-15 56.88	4.39	-13.37	4.37	17.40	13.1	20.5	82.4	12.9	102
1986	12	17	.0	2446781.5	11 36.408	-15 47.54	11 38.271	-15 59.67	4.38	-13.44	4.38	17.38	13.1	20.5	83.5	12.9	91
1986	12	18	.0	2446782.5	11 36.057	-15 50.25	11 37.920	-16 2.38	4.38	-13.50	4.39	17.36	13.1	20.5	84.5	12.9	[illegible]
1986	12	19	.0	2446783.5	11 35.688	-15 52.88	11 37.552	-16 5.01	4.37	-13.55	4.40	17.35	13.1	20.5	85.5	12.9	68
1986	12	20	.0	2446784.5	11 35.304	-15 55.41	11 37.167	-16 7.55	4.36	-13.59	4.41	17.33	13.1	20.5	86.6	12.9	57
1986	12	21	.0	2446785.5	11 34.902	-15 57.87	11 36.766	-16 10.00	4.35	-13.62	4.42	17.31	13.1	20.5	87.6	12.8	46
1986	12	22	.0	2446786.5	11 34.484	-16 .23	11 36.348	-16 12.36	4.34	-13.64	4.43	17.29	13.1	20.5	88.7	12.8	35
1986	12	23	.0	2446787.5	11 34.049	-16 2.50	11 35.913	-16 14.63	4.34	-13.64	4.44	17.27	13.1	20.5	89.7	12.[illegible]	26
1986	12	24	.0	2446788.5	11 33.597	-16 4.67	11 35.461	-16 16.81	4.33	-13.64	4.45	17.25	13.1	20.5	90.8	12.8	19
1986	12	25	.0	2446789.5	11 33.128	-16 6.75	11 34.992	-16 18.89	4.32	-13.62	4.46	17.23	13.1	20.5	91.8	12.7	20
1986	12	26	.0	2446790.5	11 32.642	-16 8.74	11 34.506	-16 20.87	4.31	-13.60	4.47	17.21	13.1	20.5	92.9	12.7	27
1986	12	27	.0	2446791.5	11 32.139	-16 10.62	11 34.003	-16 22.75	4.30	-13.56	4.48	17.19	13.1	20.5	94.0	12.6	38
1986	12	28	.0	2446792.5	11 31.619	-16 12.40	11 33.483	-16 24.53	4.30	-13.50	4.49	17.17	13.1	20.5	95.1	12.6	51
1986	12	29	.0	2446793.5	11 31.082	-16 14.07	11 32.945	-16 26.21	4.29	-13.44	4.50	17.15	13.1	20.5	96.1	12.5	65
1986	12	30	.0	2446794.5	11 30.527	-16 15.64	11 32.391	-16 27.78	4.28	-13.36	4.51	17.14	13.1	20.5	97.2	12.5	79
1986	12	31	.0	2446795.5	11 29.955	-16 17.10	11 31.819	-16 29.23	4.27	-13.27	4.52	17.12	13.1	20.5	98.3	12.4	94
1987	1	1	.0	2446796.5	11 29.366	-16 18.44	11 31.230	-16 30.58	4.27	-13.17	4.53	17.10	13.1	20.5	99.4	12.4	108
1987	1	2	.0	2446797.5	11 28.760	-16 19.67	11 30.624	-16 31.81	4.26	-13.05	4.54	17.08	13.1	20.5	100.5	12.3	123
1987	1	3	.0	2446798.5	11 28.136	-16 20.79	11 30.000	-16 32.93	4.25	-12.92	4.55	17.06	13.1	20.5	101.5	12.2	136
1987	1	4	.0	2446799.5	11 27.496	-16 21.78	11 29.360	-16 33.92	4.24	-12.78	4.56	17.04	13.1	20.5	102.6	12.1	148
1987	1	5	.0	2446800.5	11 26.838	-16 22.66	11 28.702	-16 34.80	4.24	-12.62	4.57	17.02	13.1	20.5	103.7	12.1	157
1987	1	6	.0	2446801.5	11 26.164	-16 23.42	11 28.027	-16 35.55	4.23	-12.45	4.58	17.01	13.1	20.5	104.8	12.0	160
1987	1	7	.0	2446802.5	11 25.473	-16 24.05	11 27.336	-16 36.18	4.22	-12.27	4.59	16.99	13.2	20.5	105.9	11.9	155
1987	1	8	.0	2446803.5	11 24.765	-16 24.55	11 26.628	-16 36.68	4.21	-12.08	4.60	16.97	13.2	20.5	107.0	11.8	146
1987	1	9	.0	2446804.5	11 24.041	-16 24.93	11 25.904	-16 37.06	4.21	-11.87	4.61	16.95	13.2	20.5	108.1	11.7	135
1987	1	10	.0	2446805.5	11 23.300	-16 25.18	11 25.163	-16 37.31	4.20	-11.66	4.62	16.93	13.2	20.5	109.3	11.6	124
1987	1	11	.0	2446806.5	11 22.543	-16 25.30	11 24.406	-16 37.43	4.19	-11.43	4.63	16.92	13.2	20.5	110.4	11.5	113
1987	1	12	.0	2446807.5	11 21.770	-16 25.29	11 23.632	-16 37.41	4.19	-11.18	4.64	16.90	13.2	20.5	111.5	11.4	102
1987	1	13	.0	2446808.5	11 20.981	-16 25.14	11 22.843	-16 37.26	4.18	-10.93	4.65	16.88	13.2	20.5	112.6	11.3	91
1987	1	14	.0	2446809.5	11 20.176	-16 24.86	11 22.039	-16 36.98	4.18	-10.66	4.66	16.86	13.2	20.5	113.7	11.1	79
1987	1	15	.0	2446810.5	11 19.356	-16 24.45	11 21.218	-16 36.55	4.17	-10.38	4.67	16.84	13.2	20.5	114.8	11.0	68
1987	1	16	.0	2446811.5	11 18.520	-16 23.88	11 20.382	-16 35.99	4.16	-10.09	4.68	16.83	13.2	20.5	116.0	10.9	57
1987	1	17	.0	2446812.5	11 17.669	-16 23.19	11 19.530	-16 35.29	4.16	-9.79	4.69	16.81	13.2	20.5	117.1	10.8	46
1987	1	18	.0	2446813.5	11 16.803	-16 22.35	11 18.664	-16 34.45	4.15	-9.47	4.70	[illegible].79	13.2	20.6	118.2	10.6	36

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)	DEC.	R.A. (APPN)	DEC.	DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1987	1	19	.0	2446814.5	11 15.923	-16 21.36	11 17.783	-16 33.46	4.15	-9.14	4.71	16.77	13.2	20.6	119.3	10.5	27
1987	1	20	.0	2446815.5	11 15.028	-16 20.24	11 16.888	-16 32.32	4.14	-8.80	4.72	16.76	13.2	20.6	120.4	10.4	21
1987	1	21	.0	2446816.5	11 14.119	-16 18.97	11 15.978	-16 31.05	4.14	-8.45	4.73	16.74	13.2	20.6	121.6	10.2	22
1987	1	22	.0	2446817.5	11 13.196	-16 17.55	11 15.055	-16 29.62	4.13	-8.09	4.74	16.72	13.2	20.6	122.7	10.1	29
1987	1	23	.0	2446818.5	11 12.259	-16 15.98	11 14.118	-16 28.05	4.13	-7.71	4.75	16.70	13.2	20.6	123.8	9.9	39
1987	1	24	.0	2446819.5	11 11.310	-16 14.27	11 13.168	-16 26.33	4.12	-7.32	4.76	16.69	13.2	20.6	124.9	9.8	51
1987	1	25	.0	2446820.5	11 10.347	-16 12.40	11 12.205	-16 24.45	4.12	-6.92	4.76	16.67	13.2	20.6	126.1	9.6	64
1987	1	26	.0	2446821.5	11 9.372	-16 10.38	11 11.229	-16 22.43	4.11	-6.51	4.77	16.65	13.2	20.6	127.2	9.5	78
1987	1	27	.0	2446822.5	11 8.384	-16 8.22	11 10.242	-16 20.26	4.11	-6.08	4.78	16.64	13.2	20.6	128.3	9.3	92
1987	1	28	.0	2446823.5	11 7.385	-16 5.90	11 9.242	-16 17.93	4.11	-5.64	4.79	16.62	13.2	20.6	129.4	9.1	106
1987	1	29	.0	2445824.5	11 6.374	-16 3.42	11 8.231	-16 15.45	4.10	-5.19	4.80	16.60	13.2	20.6	130.6	9.0	120
1987	1	30	.0	2446825.5	11 5.352	-16 .80	11 7.209	-16 12.82	4.10	-4.73	4.81	16.59	13.2	20.6	131.7	8.8	134
1987	1	31	.0	2446826.5	11 4.320	-15 58.02	11 6.176	-16 10.03	4.10	-4.26	4.82	16.57	13.3	20.6	132.8	8.6	146
1987	2	1	.0	2446827.5	11 3.278	-15 55.09	11 5.133	-16 7.09	4.10	-3.77	4.83	16.55	13.3	20.6	133.9	8.5	155
1987	2	2	.0	2446828.5	11 2.226	-15 52.01	11 4.081	-16 4.00	4.09	-3.28	4.84	16.54	13.3	20.6	135.0	8.3	158
1987	2	3	.0	2446829.5	11 1.165	-15 48.78	11 3.020	-16 .76	4.09	-2.77	4.85	16.52	13.3	20.6	136.1	8.1	152
1987	2	4	.0	2446830.5	11 .096	-15 45.39	11 1.950	-15 57.36	4.09	-2.26	4.86	16.50	13.3	20.6	137.2	7.9	143
1987	2	5	.0	2446831.5	10 59.018	-15 41.86	11 .872	-15 53.82	4.09	-1.74	4.87	16.49	13.3	20.6	138.3	7.7	132
1987	2	6	.0	2446832.5	10 57.933	-15 38.18	10 59.766	-15 50.12	4.09	-1.20	4.88	16.47	13.3	20.6	139.3	7.6	121
1987	2	7	.0	2446833.5	10 56.841	-15 34.35	10 58.694	-15 46.28	4.09	-.66	4.89	16.45	13.3	20.6	140.4	7.4	110
1987	2	8	.0	2446834.5	10 55.743	-15 30.37	10 57.595	-15 42.29	4.09	-.11	4.90	16.44	13.3	20.6	141.5	7.2	99
1987	2	9	.0	2446835.5	10 54.639	-15 26.25	10 56.491	-15 38.16	4.09	.44	4.91	16.42	13.3	20.6	142.5	7.0	88
1987	2	10	.0	2446836.5	10 53.529	-15 21.99	10 55.380	-15 33.88	4.09	1.01	4.92	16.40	13.3	20.6	143.5	6.8	76
1987	2	11	.0	2446837.5	10 52.414	-15 17.58	10 54.265	-15 29.46	4.09	1.58	4.93	16.39	13.3	20.6	144.6	6.7	65
1987	2	12	.0	2446838.5	10 51.295	-15 13.03	10 53.146	-15 24.90	4.09	2.16	4.94	16.37	13.3	20.6	145.6	6.5	54
1987	2	13	.0	2446839.5	10 50.172	-15 8.35	10 52.023	-15 20.20	4.09	2.74	4.95	16.36	13.3	20.6	146.6	6.3	44
1987	2	14	.0	2446840.5	10 49.047	-15 3.53	10 50.897	-15 15.37	4.09	3.33	4.96	16.34	13.3	20.6	147.5	6.1	34
1987	2	15	.0	2446841.5	10 47.916	-14 58.58	10 49.768	-15 10.40	4.10	3.93	4.96	16.32	13.3	20.6	148.5	6.0	26
1987	2	16	.0	2446842.5	10 46.787	-14 53.49	10 48.636	-15 5.30	4.10	4.53	4.97	16.31	13.4	20.6	149.4	5.8	22
1987	2	17	.0	2446843.5	10 45.655	-14 48.28	10 47.504	-15 .07	4.10	5.14	4.98	16.29	13.4	20.7	150.3	5.6	25
1987	2	18	.0	2446844.5	10 44.522	-14 42.93	10 46.370	-14 54.71	4.10	5.76	4.99	16.28	13.4	20.7	151.2	5.5	33
1987	2	19	.0	2446845.5	10 43.388	-14 37.47	10 45.236	-14 49.23	4.11	6.38	5.00	16.26	13.4	20.7	152.0	5.3	44
1987	2	20	.0	2446846.5	10 42.255	-14 31.88	10 44.102	-14 43.62	4.11	7.00	5.01	16.24	13.4	20.7	152.9	5.2	55
1987	2	21	.0	2446847.5	10 41.122	-14 26.17	10 42.969	-14 37.90	4.12	7.63	5.02	16.23	13.4	20.7	153.6	5.0	68
1987	2	22	.0	2446848.5	10 39.990	-14 20.35	10 41.837	-14 32.06	4.12	8.26	5.03	16.21	13.4	20.7	154.4	4.9	81
1987	2	23	.0	2446849.5	10 38.861	-14 14.42	10 40.708	-14 26.11	4.13	8.90	5.04	16.20	13.4	20.7	155.1	4.7	94
1987	2	24	.0	2446850.5	10 37.733	-14 8.37	10 39.580	-14 20.05	4.13	9.54	5.05	16.18	13.4	20.7	155.7	4.6	108
1987	2	25	.0	2446851.5	10 36.609	-14 2.22	10 38.456	-14 13.88	4.14	10.19	5.06	16.17	13.4	20.7	156.3	4.5	121
1987	2	26	.0	2446852.5	10 35.488	-13 55.97	10 37.335	-14 7.61	4.14	10.83	5.07	16.15	13.4	20.7	156.9	4.4	134
1987	2	27	.0	2446853.5	10 34.371	-13 49.62	10 36.218	-14 1.24	4.15	11.48	5.08	16.14	13.4	20.7	157.4	4.3	146
1987	2	28	.0	2446854.5	10 33.260	-13 43.18	10 35.106	-13 54.78	4.16	12.13	5.09	16.12	13.5	20.7	157.8	4.2	154
1987	3	1	.0	2446855.5	10 32.153	-13 36.64	10 33.999	-13 48.22	4.16	12.79	5.10	16.11	13.5	20.7	158.1	4.2	156
1987	3	2	.0	2446856.5	10 31.052	-13 30.02	10 32.897	-13 41.58	4.17	13.44	5.11	16.09	13.5	20.7	158.4	4.1	150
1987	3	3	.0	2446857.5	10 29.957	-13 23.31	10 31.803	-13 34.85	4.18	14.09	5.11	16.08	13.5	20.7	158.6	4.0	140
1987	3	4	.0	2446858.5	10 28.870	-13 16.53	10 30.715	-13 28.05	4.19	14.74	5.12	16.06	13.5	20.8	158.8	4.0	129
1987	3	5	.0	2446859.5	10 27.789	-13 9.67	10 29.634	-13 21.17	4.20	15.39	5.13	16.04	13.5	20.8	158.9	4.0	118
1987	3	6	.0	2446860.5	10 26.717	-13 2.75	10 28.562	-13 14.23	4.20	16.04	5.14	16.03	13.5	20.8	158.9	4.0	106
1987	3	7	.0	2446861.5	10 25.653	-12 55.76	10 27.498	-13 7.21	4.21	16.68	5.15	16.01	13.5	20.8	158.8	4.0	95
1987	3	8	.0	2446862.5	10 24.598	-12 48.71	10 26.443	-13 .14	4.22	17.33	5.16	16.00	13.5	20.8	158.6	4.0	84
1987	3	9	.0	2446863.5	10 23.552	-12 41.60	10 25.397	-12 53.02	4.23	17.97	5.17	15.99	13.6	20.8	158.4	4.1	72
1987	3	10	.0	2446864.5	10 22.516	-12 34.44	10 24.361	-12 45.84	4.24	18.61	5.18	15.97	13.6	20.8	158.1	4.1	61
1987	3	11	.0	2446865.5	10 21.489	-12 27.23	10 23.334	-12 38.61	4.26	19.24	5.19	15.96	13.6	20.8	157.7	4.2	51
1987	3	12	.0	2446866.5	10 20.474	-12 19.98	10 22.319	-12 31.34	4.27	19.87	5.20	15.94	13.6	20.8	157.3	4.2	41
1987	3	13	.0	2446867.5	10 19.469	-12 12.69	10 21.314	-12 24.03	4.28	20.50	5.21	15.93	13.6	20.8	156.8	4.3	31
1987	3	14	.0	2446668.5	10 18.476	-12 5.37	10 20.321	-12 16.68	4.29	21.12	5.22	15.91	13.6	20.8	156.3	4.4	25
1987	3	15	.0	2446869.5	10 17.494	-11 58.01	10 19.339	-12 9.30	4.30	21.73	5.23	15.90	13.6	20.9	155.7	4.5	23

Table B-2 (contd)

YR	MN	DY	HR	J.D.	R.A. (1950.0)		DEC.		R.A. (APPN)		DEC.		DELTA	DELDOT	R	RDOT	TMAG	NMAG	THETA	BETA	MOON
1987	3	16	.0	2446870.5	10	[illegible].324	-11	50.63	10	18.369	-12	1.90	4.32	22.35	5.23	15.88	13.6	20.9	155.1	4.6	28
1987	3	17	.0	2446871.5	10	15.567	-11	43.23	10	17.412	-11	54.48	4.33	22.95	5.24	15.87	13.6	20.9	154.4	4.7	37
1987	3	18	.0	2446872.5	10	14.622	-11	35.81	10	16.467	-11	47.04	4.34	23.56	5.25	15.85	13.7	20.9	153.7	4.8	48
1987	3	19	.0	2446873.5	10	13.690	-11	28.38	10	15.535	-11	39.56	4.36	24.15	5.26	15.84	13.7	20.9	152.9	4.9	60
1987	3	20	.0	2446874.5	10	12.771	-11	20.93	10	14.616	-11	32.11	4.37	24.74	5.27	15.82	13.7	20.9	152.2	5.1	73
1987	3	21	.0	2446875.5	10	11.865	-11	13.48	10	13.711	-11	24.64	4.38	25.33	5.28	15.81	13.7	20.9	151.3	5.2	86
1987	3	22	.0	2446876.5	10	10.974	-11	6.02	10	12.819	-11	17.17	4.40	25.91	5.29	15.80	13.7	20.9	150.5	5.3	99
1987	3	23	.0	2446877.5	10	10.096	-10	58.57	10	11.942	-11	9.70	4.41	26.48	5.30	15.78	13.7	20.9	149.7	5.5	112
1987	3	24	.0	2446878.5	10	9.232	-10	51.12	10	11.079	-11	2.23	4.43	27.05	5.31	15.77	13.7	21.0	148.8	5.6	125
1987	3	25	.0	2446879.5	10	8.383	-10	43.69	10	10.230	-10	54.77	4.45	27.61	5.32	15.75	13.8	21.0	147.9	5.7	137
1987	3	26	.0	2446880.5	10	7.549	-10	36.26	10	9.396	-10	47.32	4.46	28.16	5.33	15.74	13.8	21.0	147.0	5.9	148
1987	3	27	.0	2446881.5	10	6.729	-10	28.85	10	8.576	-10	39.89	4.48	28.71	5.34	15.72	13.8	21.0	146.0	6.0	155
1987	3	28	.0	2446882.5	10	5.925	-10	21.46	10	7.772	-10	32.48	4.50	29.25	5.34	15.71	13.8	21.0	145.1	6.1	155
1987	3	29	.0	2446883.5	10	5.138	-10	14.09	10	6.983	-10	25.10	4.51	29.78	5.35	15.70	13.8	21.0	144.1	6.3	148
1987	3	30	.0	2446884.5	10	4.361	-10	6.76	10	6.209	-10	17.74	4.53	30.30	5.36	15.68	13.8	21.0	143.2	6.4	138
1987	3	31	.0	2446885.5	10	3.603	- 9	59.45	10	5.451	-10	10.41	4.55	30.81	5.37	15.67	13.8	21.0	142.2	6.5	127
1987	4	1	.0	2446886.5	10	2.860	- 9	52.18	10	4.709	-10	3.12	4.57	31.31	5.38	15.65	13.8	21.1	141.2	6.7	115
1987	4	2	.0	2446887.5	10	2.134	- 9	44.94	10	3.962	- 9	55.86	4.58	31.80	5.39	15.64	13.9	21.1	140.2	6.8	104
1987	4	3	.0	2446888.5	10	1.423	- 9	37.75	10	3.272	- 9	48.65	4.60	32.29	5.40	15.63	13.9	21.1	139.2	6.9	92
1987	4	4	.0	2446889.5	10	.728	- 9	30.59	10	2.577	- 9	41.48	4.62	32.76	5.41	15.61	13.9	21.1	138.2	7.1	81
1987	4	5	.0	2446890.5	10	.049	- 9	23.49	10	1.898	- 9	34.36	4.64	33.22	5.42	15.60	13.9	21.1	137.2	7.2	69
1987	4	6	.0	2446891.5	9	59.386	- 9	16.44	10	1.236	- 9	27.29	4.66	33.68	5.43	15.59	13.9	21.1	136.2	7.3	59
1987	4	7	.0	2446892.5	9	58.739	- 9	9.43	10	.589	- 9	20.27	4.68	34.12	5.43	15.57	13.9	21.1	135.2	7.5	48
1987	4	8	.0	2446893.5	9	58.108	- 9	2.49	9	59.959	- 9	13.30	4.70	34.56	5.44	15.56	14.0	21.1	134.2	7.6	38
1987	4	9	.0	2446894.5	9	57.494	- 8	55.59	9	59.345	- 9	6.40	4.72	34.98	5.45	15.54	14.0	21.2	133.1	7.7	29
1987	4	10	.0	2446895.5	9	56.895	- 8	48.76	9	58.747	- 8	59.55	4.74	35.39	5.46	15.53	14.0	21.2	132.1	7.8	24
1987	4	11	.0	2446896.5	9	56.313	- 8	41.99	9	58.164	- 8	52.76	4.76	35.80	5.47	15.52	14.0	21.2	131.1	7.9	23
1987	4	12	.0	2446897.5	9	55.746	- 8	35.29	9	57.598	- 8	46.04	4.78	36.19	5.48	15.50	14.0	21.2	130.1	8.0	29
1987	4	13	.0	2446898.5	9	55.196	- 8	28.65	9	57.048	- 8	39.38	4.80	36.57	5.49	15.49	14.0	21.2	129.0	8.2	38
1987	4	14	.0	2446899.5	9	54.661	- 8	22.07	9	56.514	- 8	32.79	4.82	36.94	5.50	15.48	14.0	21.2	128.0	8.3	49
1987	4	15	.0	2446900.5	9	54.143	- 8	15.57	9	55.996	- 8	26.27	4.8[illegible]	37.31	5.51	15.46	14.1	21.2	127.0	8.4	62
1987	4	16	.0	2446901.5	9	53.640	- 8	9.13	9	55.494	- 8	19.83	4.87	37.66	5.52	15.45	14.1	21.2	126.0	8.5	75
1987	4	17	.0	2446902.5	9	53.153	- 8	2.77	9	55.007	- 8	13.45	4.89	38.01	5.52	15.44	14.1	21.3	125.0	8.6	88
1987	4	18	.0	2446903.5	9	52.682	- 7	56.48	9	54.537	- 8	7.15	4.91	3[illegible].34	5.53	15.42	14.1	21.3	123.9	8.7	101
1987	4	19	.0	2446904.5	9	52.227	- 7	50.27	9	54.082	- 8	.92	4.93	3[illegible].67	5.54	15.41	14.1	21.3	122.9	8.8	114
1987	4	20	.0	2446905.5	9	51.787	- 7	44.14	9	53.643	- 7	54.78	4.95	38.98	5.55	15.40	14.1	21.3	121.9	8.8	127
1987	4	21	.0	2446906.5	9	51.363	- 7	38.08	9	53.219	- 7	48.70	4.98	39.29	5.56	15.38	14.1	21.3	120.9	8.9	139
1987	4	22	.0	2446907.5	9	50.954	- 7	32.10	9	52.810	- 7	42.71	5.00	39.58	5.57	15.37	14.2	21.3	119.9	9.0	150
1987	4	23	.0	2446908.5	9	50.561	- 7	26.20	9	52.417	- 7	36.80	5.02	39.87	5.58	15.36	14.2	21.3	118.8	9.1	156
1987	4	24	.0	2446909.5	9	50.182	- 7	20.38	9	52.039	- 7	30.97	5.05	40.14	5.59	15.35	14.2	21.4	117.8	9.2	156
1987	4	25	.0	2446910.5	9	49.819	- 7	14.65	9	51.677	- 7	25.22	5.07	40.41	5.60	15.33	14.2	21.4	116.8	9.2	149
1987	4	26	.0	2446911.5	9	49.471	- 7	9.00	9	51.329	- 7	19.56	5.09	40.66	5.60	15.32	14.2	21.4	115.8	9.3	138
1987	4	27	.0	2446912.5	9	49.138	- 7	3.43	9	50.996	- 7	13.99	5.12	40.91	5.61	15.31	14.2	21.4	114.8	9.4	127
1987	4	28	.0	2446913.5	9	48.820	- 6	57.95	9	50.679	- 7	8.50	5.14	41.14	5.62	15.29	14.3	21.4	113.8	9.4	115
1987	4	29	.0	2446914.5	9	48.517	- 6	52.56	9	50.376	- 7	3.09	5.16	41.36	5.63	15.28	14.3	21.4	112.8	9.5	103
1987	4	30	.0	2446915.5	9	48.228	- 6	47.25	9	50.087	- 6	57.78	5.19	41.57	5.64	15.27	14.3	21.4	111.8	9.5	92
1987	5	1	.0	2446916.5	9	47.954	- 6	42.03	9	49.813	- 6	52.55	5.21	41.78	5.65	15.26	14.3	21.4	110.8	9.6	80
1987	5	2	.0	2446917.5	9	47.694	- 6	36.90	9	49.554	- 6	47.41	5.24	41.97	5.66	15.24	14.3	21.5	109.8	9.6	69
1987	5	3	.0	2446918.5	9	47.448	- 6	31.86	9	49.308	- 6	42.37	5.26	42.14	5.67	15.23	14.3	21.5	108.8	9.7	58
1987	5	4	.0	2446919.5	9	47.216	- 6	26.91	9	49.077	- 6	37.41	5.28	42.31	5.67	15.22	14.3	21.5	107.8	9.7	48

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